Spring 2019

Tenth-Grade Student–Participants' Perceptions of a Growth Mindset Curriculum: An Action Research Study

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Submitted in Partial Fulfillment of the Requirements

For the Degree of Doctor of Education in

Curriculum and Instruction

College of Education

University of South Carolina

2019

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Dedication

I dedicate this work to my family, who made many sacrifices in order for me to accomplish this dissertation, while offering their total support. To my husband, AJ, thank you for all of the encouragement you gave and the quiet time you created. To my children, Covy, Caden, and Caroline, thank you for understanding that sometimes I just needed to work. I hope that I have inspired you to make goals, work hard, and persevere. I love you all more than words could express.

Acknowledgements

There are so many people to thank, and without any one of them, this dissertation would never have come to be. Thank you to Dr. Susan Schramm-Pate who helped me to establish a clear focus. Thank you to my committee members for their willingness to provide feedback and support. In particular, I would like to thank Cindy Lahar for her support not only in this realm, but in others, and for being a friend. Thank you to my fellow Cohort G members who offered support and kept me sane. Thank you to Jen Gadbow for helping me to get through the final stretch and for giving me hope that I might actually make it to the end. Thank you to Alex MacPhail for her total support and understanding, and to Katie Conant for her thoughtfulness. Thank you to my advisory class for collaborating with me on this research, taking it seriously, and providing excellent feedback. Thank you to John Drisko for asking to read this dissertation and listening to what I had to say. Lastly, thank you to my parents who always made education a priority.

Abstract

The purpose of this action research study was to describe nine tenth-grade student-participants' perceptions of a growth mindset curriculum based on the educational theory developed by Dweck (2006). The curriculum focused on the core aspects of Dweck's (2006) theory: (a).understanding brain growth and neuroplasticity, (b) having a productive attitude about making mistakes and experiencing failure, and (c) expending effort and developing perseverance (Dweck, 2006). The teacher-researcher implemented the Growth Mindset Unit in a small high school in a coastal town in southern Maine during the teacher-researcher's advisory class. The school has a proficiency-based grading system in which students benefit from developing a growth mindset in order to meet the districts' competencies and standards. Data was collected using a pre- and post-test survey, semi-structured interviews, and a focus group. The teacher-researcher found that (a) there was an overall increase in the average growth mindset for the class, (b) the student-participants perceived the construct of growth mindset in the school's proficiency-based system to be valuable, and (c) the student-participants felt there should be changes to the Growth Mindset Unit to make it more engaging. Changes were made and shared with the student-participants in a focus group setting. An action plan was developed to present to the ninth-grade advisory class teachers regarding growth mindset and how to

implement a Growth Mindset Unit. The goal would be to implement the Growth Mindset Unit for all ninth-graders in their advisory classes.

Keywords: neuroplasticity, growth mindset, proficiency-based learning and grading, action research, grit, advisory program, affective domain

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Key Terms

Affective domain	The *affective domain* is a division of Bloom's Taxonomy that focuses on emotions, including feelings, values, enthusiasms, motivations, and attitudes. For teachers, it means allowing students to express themselves, encouraging participation and response, and giving students an opportunity to draw their own conclusions (Bloom, 1968; Krathwohl, Bloom, & Masia, 1964; see Anderson & Krathwohl, 2001 for revised Taxonomy).
Advisory	An *advisory* is a program designed to bring small groups of students together with one teacher for regular, brief meetings that are not content-specific but instead deal with cognitive and affective educational domains (McClure, Yonezawa & Makeba, 2010).
Fixed mindset	*Fixed mindset* is the belief that an individual is born with a certain amount of intelligence, or the capacity for certain skills or talents, and the amount cannot change (Dweck, 2006). Intelligence and talent is static.
Growth mindset	*Growth mindset* is the belief that intelligence and talent can be developed with hard work, focus, and effort (Dweck, 2006). Intelligence and talent is not static.
Neuroplasticity	*Neuroplasticity* is the capacity of the brain to change its structure through the process of learning and problem solving (Masson & Brault Foisy, 2014).
Proficiency-Based Education	*Proficiency-Based (or Mastery) Education* is an educational system in which students continue to receive instruction and assess until they have mastered the targeted knowledge or skill (Johnston, 2011).
Socioeconomic Status	According to the National Forum for Education Statistics (2015), *Socioeconomic Status "*can be defined broadly as one's access to financial, social, cultural, and human capital resources. Traditionally, a student's SES has included . . . parental educational attainment, parental occupational status, and household or family income, with appropriate adjustments for household or family composition" (p. 4)

Chapter One: Introduction

This chapter describes the action research study I conducted in the fall of 2018, in which I developed and implemented a Growth Mindset Unit. I collected data about changes in students' mindsets and their perceptions of the unit. Nine tenth-grade student-participants at Truman Academy (all names are pseudonyms)—a small, predominantly White, middle-class, public high school in southern Maine—participated in a four-week unit based on the growth mindset theory developed over two decades by Carol Dweck (2006). The goal of implementing a growth mindset unit is to better prepare students to meet competencies in a proficiency-based educational system through the development of the affective domain. The Unit focused on teaching student-participants how their brains work, how a growth mindset is scientifically proven to predict student success in school, and the ways in which the student-participants could begin to develop a growth mindset to potentially improve their performance in a proficiency-based learning system. Specifically, the Growth Mindset Unit emphasized: (a) understanding brain growth and neuroplasticity, (b) having a productive attitude about making mistakes and experiencing failure, and (c) expending effort and developing perseverance (Dweck, 2006). The goal of implementing a growth mindset unit is to better prepare students to meet competencies in a proficiency-based educational system through the development of the students' affective domain.

In 2012, Maine passed a law called L.D. 1422, *An Act to Prepare Maine People for the Future Economy*, which required schools to move towards a proficiency-based diploma. The goal was to have completely proficiency-based diplomas statewide by 2021 (Stump, Doykos, & Fallona, 2016). Although some schools delayed transitioning to a proficiency-based system, Truman and its associated school district decided to pioneer the effort and began implementation immediately (Waddell, 2018).

A proficiency-based educational system is one in which students are expected to demonstrate mastery of a knowledge or skill before they progress to the next level; the amount of time it takes a student to do this varies (Johnston, 2011). This system differs from a more traditional model of learning, where students move on to the next unit regardless of the assessment score. It has many benefits, including an emphasis on student-centered learning and mastery of knowledge and skills by all students (Johnston, 2011). Although the district chose to implement the proficiency model, it did little to prepare students for the transition and the associated challenges. I believed that by implementing a Growth Mindset Unit, I could help students build resiliency to face these challenges, by helping them gain access to an equitable and comprehensive education, thus ensuring that they graduate from high school and achieve their post-secondary goals (Dweck, 2012).

Dweck (2006) developed growth mindset theory, or implicit theory, over two decades. The theory outlines how people's beliefs about their abilities affect their achievement. In her model, Dweck (2006) introduced two major mindsets:

fixed and growth. Individuals with a fixed mindset, also called entity theory, believe that intelligence and ability are fixed and cannot be changed. Individuals with a growth mindset, or incremental theory, believe that intelligence and ability can grow over time with effort, education, and practice (Dweck, 2006). Students with a fixed mindset are more likely to interpret their lack of mastery on the first attempt as reinforcement that they are incapable of success. Students with a growth mindset are more likely to view lack of mastery on the first attempt as an indicator that they need to put in more effort. Helping student-participants move towards a growth mindset and develop their affective domain would give them a tool to prepare them to be successful in a proficiency-based system.

Problem of Practice

The identified problem of practice of the present study was Truman's school district's oversight regarding preparing students for the significant paradigm shift from a traditional Carnegie model learning system to a proficiency-based learning system, in which students were required to continue to work on each competency until they mastered it. I believed that the student-participants' acquisition of growth mindset attributes could increase the rate in which they met competencies in the proficiency-based system. I hoped that by helping student-participants acquire growth mindset attributes through a growth mindset curriculum, I could help prepare them for the challenges they faced in the new system.

Research Question

My research question was, “What are the perceptions of tenth-grade student-participants regarding a teacher-researcher developed Growth Mindset Unit?”

Statement of Purpose

The primary purpose of this action research study was to determine student-participants’ perceptions of a Growth Mindset Unit in order to make meaningful revisions to it. My plan was to discuss the revisions with students in a focus-group setting, and further revise the unit as part of the iterative research process, with a larger goal of creating a schoolwide unit, which would better prepare all Truman students to navigate the proficiency-based education system.

I implemented the Growth Mindset Unit in collaboration with the nine tenth-grade students in my advisory class. The teacher of the advisory class has the same group of students for the entirety of the students’ four years of high school. Truman established advisory classes to attend to the affective domain of the students (McClure, Yonezawa & Makeba, 2010). The affective domain focuses on students’ emotions, and teaching students emotional skills, such as growth mindset, has been shown to have a positive correlation to students’ academic outcomes (Glennie, Rosen, Snyder, Woods-Murphy, & Bassett, 2017). I decided to collaborate with this group of students because they already had some experience in the proficiency-based system, which allowed them to be reflective. Additionally, because I was designing the unit for students, it was

essential to collaborate with a group of students in order to create a unit that was engaging and relevant for them.

The secondary purpose of this study was to describe any changes in the student-participants' mindsets as a result of their participation in the Growth Mindset Unit, using a pre- and post-test survey based on the ratings scales developed by Dweck (2006) and Duckworth (2016).

Scholarly Literature

I grounded the conceptual framework for this qualitative research study primarily in the ideas of Dweck (2006) and her construct of growth mindset and secondarily, in the ideas of Duckworth (2016) and her construct of grit. I applied these constructs to the concept of a proficiency-based educational system.

Growth Mindset

Dweck's (2006) construct of Growth Mindset focused on the idea that some people hold a growth mindset and believe that they can increase their intelligence through effort and learning, and others have a fixed mindset and believe that their intelligence is innate and cannot change. In a study of all tenth graders in Chile, researchers Claro, Paunesku, and Dweck (2016) found a correlation between mindset and academic success and concluded that mindset was a significant predictor of achievement. In the study, students with a growth mindset achieved at higher levels than students with a fixed mindset did, including the students who were considered economically disadvantaged. Similarly, Dweck (2006) found that students with a growth mindset learned more effectively and were resilient when faced with challenges and adversity. She

indicated that when students believed they could improve their intelligence, they put more effort into their learning. Dweck (2010a) also asserted that teachers could change mindsets through teaching students about neuroplasticity, and by praising students for their efforts, not their intelligence. Neuroplasticity is the capacity of the brain to change its structure through the process of learning and problem solving (Masson & Brault Foisy, 2014).

Researchers have argued that teaching students about growth mindset can help them develop one (Blackwell, Trzesniewski, & Dweck, 2007). In their study of 91 seventh graders in New York City, Blackwell, Trzesniewski, and Dweck (2006) showed that students had more of a growth mindset after eight 25-minute workshops, in which they learned about the brain and neuroplasticity.

Grit

Grit, the perseverance to meet long-term goals (TED, 2013), is closely aligned with growth mindset. Duckworth (2016) conducted research at West Point and found that grit was a more predictable indicator of which cadets would complete training than high school graduation standing, leadership experience, or athletic ability. She concluded that students with a growth mindset developed grit because they were more likely to persevere when faced with challenges and adversity. Researchers have argued that teachers can help students by cultivating a growth mindset, fostering grit, and equipping students with the tools they need to persist to overcome challenges and to work towards long-term goals (Hochanadel & Finamore, 2015).

Proficiency-Based Education

Proficiency-based education has its roots in the ideas of Carroll (1963) and Bloom (1968). After studying foreign language learning, Carroll (1963) reported that there were several factors that allowed all students to reach mastery, including aptitude and perseverance. According to Carroll (1963), aptitude is not a student's ability to reach mastery; rather, aptitude is a variable that determines the amount of time a student needs to reach it. Perseverance is the amount of time a student is willing to spend to achieve mastery. This aligns with growth mindset, which holds that students need time to make mistakes and then revise until they achieve mastery, and they need to persevere in order to work through their mistakes.

Bloom (1968) expanded on the ideas of Carroll (1963) and created guidelines for establishing proficiency-based learning, or learning for mastery. Bloom (1968) believed that over ninety percent of the population was able to reach mastery of learning, but in order for that to happen, there must be important changes made to the education system. He did not support the traditional grading system in which only some students were expected to achieve an A, most students were expected to land in the average grade range, and a few were expected to fail. Instead, he supported a proficiency-based system where educators expected that all students could learn what teachers taught them. Bloom supported Carroll's (1963) assertion that, given time, most students could reach mastery. He also indicated that perseverance was a necessary part of mastery learning. Bloom (1968) recognized that, as students gained mastery

in one learning domain, they showed more perseverance in gaining mastery in another domain. He stated that, although students do not intrinsically persevere, teaching them about growth mindset could show them the importance of perseverance in both academics and brain growth, thus giving them an important tool for success in a proficiency-based system.

Ethical Considerations

It is important to provide ethical protections for research, including voluntary participation, informed consent, and confidentiality (Trochim, 2006). An internal review board at the University of South Carolina reviewed this study. Truman's school district also required informed consent as part of the research process. As the teacher-researcher, I informed both parents and student-participants of the study. Parents and the student-participants could opt out of the research at any point. To maintain confidentiality, I used pseudonyms for the student-participants and the school/district.

Potential Weaknesses

Assumptions

For this study, I assumed that student-participants had not experienced a specific growth mindset curriculum and had limited knowledge about the concept of growth mindset. I was aware that some student-participants might have previously encountered aspects of growth mindset in a classroom environment. However, I assumed that the student-participants never had explicit growth mindset instruction.

I conducted this study with nine students, which was a relatively small group. The students-participants were all tenth graders, so I could not analyze differences in perceptions between different age groups. Additionally, the diversity within the group was narrow; although there were nearly equal numbers of boys and girls, there was little racial or economic diversity within the group, so demographic group analysis was limited.

The Significance of the Study

Finding concrete ways to help students establish a growth mindset has the potential to help them increase their achievement levels on assessments, may reduce their dropout rates, and may increase the number of students that attend college (Dweck, 2006). If the student-participants perceived the curriculum favorably and it had a positive impact on their mindsets, then Truman could incorporate the curriculum into its advisory program so all students could reap the achievement benefits of increasing their growth mindsets.

Issues of Social Justice

The goal of social justice is "full and equal participation of all groups in a society that is mutually shaped to meet their needs" (Bell, 2013, p. 21). Bell (2013) recognized that "developing a social justice process in a society and world steeped in oppression is no simple feat" (p. 21). Still, Mintrop (2016) indicated that educators "can lessen the effect of societal structures or forces in the spaces they influence" (p. 27). Within my classroom, school, and potentially, even my district, implementing strategies to promote a growth mindset among socioeconomically disadvantaged students might help reduce the achievement

gap that exists between these students and their more affluent peers. As Dana and Yendol–Hoppey (2014) opined, “By generating data and evidence to support the decisions and positions you take as an educator, you help reform classrooms and schools, which results in the promotion of social justice” (Dana & Yendol–Hoppey, 2014 (p. 56).

All students deserve the opportunity to succeed. Socioeconomic status (SES) is the largest predictor of student performance (Skrla & Scheurich, 2001). Research has also shown that having a growth mindset has the greatest impact on the achievement levels of students from low SES households (Claro & Paunesku, 2014). Teaching students that intelligence is malleable and can increase has the potential to foster the achievement of students from economically disadvantaged households at Truman, thus reducing the impact of economic disparity.

Theoretical Base

The theory of constructivism supports Dweck’s (2006) mindset theory because, in constructivist learning theory, knowledge is not something that is absolute (Harasim, 2012). Rather, in a constructive process, people learn by constructing their own understanding through their experiences and by reflecting upon those experiences. Additionally, constructivist epistemology emphasizes that learners are in control of their learning (Brooks & Brooks, 1999). Growth mindset theory also asserts that students can work through challenges in order to grow their knowledge and abilities, and by doing so, they control their learning (Dweck, 2010b).

Conclusion

Intelligence is malleable (Aldrich 2013). The concept of growth mindset helps students understand that they can grow their intelligence, and researchers have shown that it can improve student learning and performance (Blackwell et al., 2007). The students that benefit most from growth mindset are those from low SES households (Claro et al., 2016).

The primary purpose of this study is to describe the perceptions of nine tenth-grade student-participants about a Growth Mindset Unit I created, in order to determine whether the unit could be used to more effectively prepare students to enter into a proficiency-based education system. The secondary purpose of the study is to determine whether the Growth Mindset unit has an impact on the mindsets of the students-participants. Chapter Two contains the literature review that provides context for my study by presenting the historical context and present research on the major themes that provide the study's framework. Chapter Three describes the qualitative action research design, including a detailed description of the sample and setting, as well as a strategically outlined methodology that includes the details of the Growth Mindset Unit and a description of the data collection tools. Chapter Four provides early analysis and interpretation of the data, the reflective stance, and a detailed description of the themes and patterns that resulted from a coding of the data collected. Chapter Five includes a summary of the findings and an action plan, designed to facilitate educational change.

Chapter Two: Related Research and Literature Review

Introduction

The purpose of Chapter Two is to historically contextualize and theoretically ground the identified problem of practice. The problem of practice involves providing better supports for students who are navigating a relatively new proficiency-based education system.

The literature I reviewed on proficiency-based education systems consisted primarily of peer-reviewed journal articles that I gathered using the Ebsco database at the Thomas Cooper Library. This research indicated that time and perseverance were two factors that influenced student success in proficiency-based systems. Further research pointed me towards two major learning ideologies that also involved time and perseverance: (a) growth mindset, an educational theory developed by Dweck (2006) and (b) grit, an ideology developed by Duckworth (2016). I also reviewed existing growth mindset curriculum, as part of the process of designing the Growth Mindset Unit, which I created for this study.

This study involved implementing a Growth Mindset Unit into the daily advisory block of nine tenth-grade students at Truman Academy, a small, middle class, predominantly White high school in southern Maine. My goal in doing this was to elicit the students' perceptions about the unit and to refine it into one that could ultimately be implemented school-wide to help all students navigate our

proficiency-based system. The research question that guided the study was, "What are the perceptions of tenth-grade student-participants regarding a teacher-researcher developed Growth Mindset Unit?" The study included me developing the unit, compiling data regarding student-participants' perception of it, revising the unit, and presenting the revised unit to the student-participants in a focus group format for further discussion, as part of the iterative research process.

Purpose of the Literature Review

The first purpose of this literature review was to review the historical and present research around mastery and proficiency-based learning to determine the areas in which we could establish supports to help students succeed in a proficiency-based system. The second purpose was to review the historical and present research around growth mindset, including expending effort and developing perseverance (Dweck, 2006), intelligence and neuroplasticity, making mistakes and experiencing failure, and the impact of a growth mindset on students and, in, particular, on students from low socioeconomic environments. The third purpose was to evaluate existing growth mindset curriculum to create a framework for my Growth Mindset Unit.

History of Mastery/Proficiency-Based Learning

Proficiency-Based Education Systems

Until recently, like many high schools in the United States, Truman Academy used the Carnegie unit system of education. The Carnegie system was established in the early twentieth century when efforts were being made to

standardize public education (Great Schools Partnership, 2013). In the Carnegie system, students receive credit based on the amount of time they spent receiving instruction from the teacher. Typically 120 hours of seat class time equals one course credit (Great Schools Partnership, 2013).

In the early 1960s, a new mindset emerged because of educational frameworks developed by Carroll (1963) and Bloom (1968). This new framework relied on the idea that almost all students could reach mastery of learning. In the Carnegie unit system, because student learning is based on how much students learned in an allotted time (Greater Schools Partnership, 2013), some students will leave with A's, indicating they have reached mastery of learning, and some will leave with a variety of other grades ranging from B's to F's. The result is that some students receive passing grades without mastering all of the intended learning (Bloom, 1968). Additionally, grades from A to F do not provide information about the progress that a student makes over time (Masters, 2013). A student who earns a D each year could hypothetically be making as much yearly progress as a student who earns an A (Masters, 2013). Through his work with foreign language learners, Carroll (1963) found that most people could master content given enough time and perseverance. He defined aptitude as the amount of time a given person would need to master the learning. He also indicated that perseverance, the amount of time a student was willing to spend on learning, was an important part of learning. His ideas became the early foundations of proficiency-based education because he believed that students

should reach mastery of learning and that teachers should be give them the time they needed to reach that goal.

Bloom (1968) aligned himself with Carroll (1963); he argued that more than ninety percent of students could master what we have to teach them. He expanded on Carroll's ideas by indicating that major changes needed to happen in the attitudes of teachers and in the learning experiences of students. According to Bloom (1963), teachers had to stop believing that only a portion of the students could learn what they were teaching. He indicated that:

> …if the students are normally distributed with respect to aptitude, [and] the kind and quality of instruction and the amount of time available for learning are made appropriate to the characteristics and needs of each student, the majority of students may be expected to achieve mastery. (p. 3)

Meta-analyses by Guskey and Pigott (1988) and Kulik, Kulik, and Bangert-Drowns (1990) revealed that mastery learning (also called proficiency-based learning) had a consistent, positive impact on student learning. Guskey and Pigott (1988) analyzed 46 classroom studies and found that mastery learning had a positive impact on student learning in almost all of them. Additionally, when the researchers assessed students on the same materials weeks later, they discovered that students who participated in mastery learning retained significantly more of the learning than the students who had not done so (Guskey & Piggot, 1988). In an analysis of 108 controlled studies of mastery learning systems, Kulik et al. (1990) found that students in ninety-three percent of the

studies scored higher on their final exams as a result of mastery learning, and seventy percent had scores high enough to be considered statistically significant. Students in these studies also reported having positive feelings towards mastery learning (Kulik et al., 1990).

More recently, Adeniji, Ameen, Drambatta, and Orilonise (2018) studied 172 senior high school geometry students in Nigeria, South Africa. Half the class received a geometry lesson using conventional teaching, in which the teacher presented the information and gave the students an assignment from the textbook as practice; the other half of the students did not move on until they had mastered the current learning. The study found that the students who were learning for mastery performed much better on the geometry assessment than the students who received traditional instruction (Adeniji et al., 2018).

In May 2012, the Maine legislature passed L.D. 1422, *An Act to Prepare Maine People for the Future Economy*, a law that mandated that all school districts implement a proficiency/mastery-based high school diploma by 2018. The amended bill, L.D. 1627, extended that deadline to the year 2021 (Stump et al., 2016). Instead of delaying the implementation of a proficiency-based education system, Truman and the associated school district wanted to be at the forefront of the movement and implemented the system immediately (Waddell, 2018). Although Truman jumped right in, the students were not satisfactorily prepared for such a paradigm shift. By researching historical context and current research around proficiency-based learning, my target was to determine what

strategies I could implement to better prepare students to navigate a proficiency-based education system.

Growth Mindset

According to Dweck (2006), having a growth mindset means that you believe that intelligence and talent can be developed by understanding brain growth and neuroplasticity, having a productive attitude about making mistakes and experiencing failure, and exerting effort and developing perseverance (Dweck, 2006). Having a fixed mindset, on the other hand, means that you believe that an individual is born with a certain amount of intelligence and that no amount of practice or education will change that (Dweck, 2006). In this section, I discuss effort and perseverance as the link between growth mindset and mastery learning, the research on growth mindset and intelligence, the research on mistakes and failure, and the impact of growth mindset on students.

Effort and Perseverance as a Link Between Mastery Learning and Growth Mindset

As the research indicates, mastery learning, also known as proficiency-based educational systems, has historically been a successful way to increase student achievement on assessments. Bloom (1968) and Carroll (1963) both asserted that perseverance is a key component to mastery learning, and that if a student perseveres to master one task, that student will be more likely to persevere in other tasks. The idea that all students can learn to mastery and that students who persevere in one task are more likely to persevere in others aligns with Dweck's (2006) concept of growth mindset. Dweck (2010a) supported the

idea of proficiency-based education because she believed in a system where students receive credit for their efforts and have a chance to improve, even if they do not master a particular unit. She also asserted that all students can learn, and the more a student perseveres through difficult tasks, the more likely he or she is to do it again. Dweck and her colleagues (Blackwell et al., 2007) argued that students with a growth mindset "hold more positive beliefs about effort and make fewer ability-based, 'helpless' attributions, with the result that they choose more positive, effort-based strategies in response to failure" (p. 258).

Because students with a growth mindset strive to improve their ability instead of demonstrating or trying to prove it, they often enjoy the practice that is involved in increasing ability (Aditomo, 2015; Boyd, 2014). Thus, they are more willing to put in the extra time and effort in order to achieve a goal (Robinson, 2017). Of two students who are otherwise equal, the one who adopts a growth mindset will likely have greater academic achievement (Claro et al., 2016). As Dweck (2006) proclaimed, effort is what ignites ability and turns it into accomplishment: "even geniuses have to work hard for their achievements" (p. 41).

Students with a fixed mindset are only interested in their performance on the final product. Whether it is a project or an athletic competition, they find the formative practices leading up to the end product to be drudgery (Boyd, 2014). According to a study by Dweck (2006), the brain activity of individuals with fixed mindsets only activated when they heard whether their answers were right or

wrong. This mindset can have a significant negative impact on academic achievement; students with a fixed mindset are focused on the outcome only and not on the process of learning. Students with a fixed mindset are also more likely to give up on challenging problems (Robinson, 2017).

Growth Mindset and Intelligence

Conventional wisdom held that an individual's brain development was mostly complete. Researchers believed that, by early childhood, the brain was ninety percent of its adult weight, which changed little after the age of five (Bryck & Fisher, 2012). This belief was used to ground the concept of a fixed intelligence quotient (IQ), that IQ remains nearly constant from year to year (O'Neill, 1937). The assumption was that intelligence would not change over one's lifetime (Buoncristiani & Buoncristiani, 2012). A longitudinal follow-up to the Scottish Mental Studies concluded that IQ was relatively static over the course of an individual's lifetime, and therefore so was brain growth (Deary, Whalley, Lemmon, Crawford, & Starr, 2000). When researchers gave children an IQ test at age 11, then tested again at age 77, they found that intelligence showed "high stability across most of the human lifespan" (Deary et al, 2000, p. 54); IQ scores changed very little. Based on these kinds of studies, educators and others therefore thought that you could test a young child's cognitive ability and use the results to predict future academic success. According to Dweck (2006), individuals who hold that intelligence is innate and cannot change, have a fixed mindset**.**

Research supports that the human brain has changed over time and can grow on an individual scale over a person's lifetime. Understanding this is a critical piece of Dweck's (2006) theory of growth mindset. IQ scores of humans in general have risen dramatically over time, a phenomenon known as the Flynn effect, named after James Flynn who tediously documented this rise (Kanaya, Scullin, & Ceci, 2003). Flynn (2007) recorded a 25-point increase in IQ in the United States over the course of 70 years, across genders and social classes. Similarly, in a study of five-year-olds in 1967 and five-year-olds in 1987, Fuggle, Tokar, Grant, and Smith (1992) found that the average IQ score rose from 105 to 113, illustrating that the average intelligence of humans is increasing. Researchers argue that social progress, educational reform, increased educational opportunities, and improved living environments have all affected the longitudinal change in intelligence scores (Fitzgerald & Laurian-Fitzgerald, 2016).

More recent research suggests that IQ not only develops over generations, but can also grow over the course of an individual's life. As Fitzgerald and Laurian-Fitzgerald (2016) argued, "We have to disenthrall ourselves from the idea that intelligence and talent are set in us at birth." Researchers have shown that the brain "is not the immutable organ it was thought to be during the first three quarters of the 20th century" (Buoncristiani & Buoncristiani, 2012, p. 2). The results of brain imaging and postmortem brain studies indicate that human brain development is far from complete in early childhood. The ratio of gray matter to white matter, particularly in the cerebral cortex, reflects both synaptic pruning and myelination, which indicates that

unused connections are ended and new ones are made throughout a person's life (Bryck & Fisher, 2012). These changes in the brain reflect faster network connections and increased neural efficiency (Bryck & Fisher, 2012). However, these changes take time. Neurons need to fire together repeatedly in order to increase their connections (Masson & Brault Foisy, 2014). Conversely, neurons that do not fire together for a length of time decrease in connective strength (Masson & Brault Foisy, 2014).

Neuroplasticity. Brain research indicates that the brain development is not static, but dynamic; the more we learn, the more we are able to learn (Fitzgerald & Laurian–Fitzgerald, 2016). The brain can grow and change throughout a person's lifetime, not just in early childhood (Dweck, 2012). As Buoncristiani and Buoncristiani (2012) explained, "Each human brain is plastic; it is in a constant process of reforming itself" (p. 2). The term neuroplasticity means that neural pathways—the pathways that exist between neurons—can be increased as a result of experiences (Jenson, 2009; Robinson, 2017). Thus, past performance does not limit future performance (Zalaznick, 2015). We can all become more intelligent, more skilled, and more talented (Fitzgerald & Laurian-Fitzgerald, 2016). Knowing that the brain can be reconfigured means that teaching and learning can be modified to prevent students from failing high school, thereby increasing graduation rates (Zalaznick, 2015). Students can also potentially become more interested in learning when they know that they can increase their intelligence and abilities through study and practice (Robinson, 2017).

Teaching about neuroplasticity explicitly can help students develop a growth mindset (Dweck, 2006). At Truman, teaching students about neuroplasticity as part of the Growth Mindset Unit may help them understand that they can continue to grow their knowledge, skills, and intelligence. This will allow them to navigate our proficiency-based education system in which, if they initially do not succeed, they can continue their learning and grow their skills and knowledge until they reach mastery.

Socioeconomic status and intelligence Although genetics plays a role, intelligence is not determined solely by genetics; but also by socioeconomic status, home environment, nutrition, and early childhood experiences and interventions (Jenson, 2009). To show that IQ is variable, researchers experimented with adjusting the influential factors to measure the impact on IQ. Duyme, Dumart, & Tomkiewicz (1999) conducted a longitudinal study of children in the adoption system who came from neglected or abusive situations and were subsequently placed with parents had good jobs and were likely to take the children to museums and libraries. They found that the IQs of these children increased from an average score of 77 to an average score of 91, with some children showing an increase of as much as 20 points.

Skeels (1966) conducted a similar study using children who were labeled "mentally retarded." The children were living in an orphanage and he provided them with three years of an enriching environment. At the end of the three years, the experimental group gained an average of 29 IQ points. When Skeels compared those scores to a control group who were not labeled as retarded and

who remained in the orphanage; the control group lost an average of 26 IQ points.

Both the Duyme et al. (1999) and Skeels (1966) studies show that the key to igniting neuroplasticity, improving brain function, and increasing intelligence is to have enriching experiences (Jenson, 2009). Educational practices have the potential to provide students with these experiences, promote brain function, and potentially ameliorate poverty-related gaps.

Research on Mistakes and Failure

Research shows that mistakes are important opportunities for learning and brain growth (Boaler, 2013). Students often regard mistakes as indicators of inability. Every time student makes a mistake, they think about what they did and new synapses form in their brains. These synapses lead to brain growth. Students and teachers therefore should value mistakes as important learning experiences. Indeed, Boaler (2013) argued that students should engage in challenging work that results in mistakes, and that their mistakes should be valued for the opportunities they provide for brain development and learning.

Growth mindset theory does not imply that all individuals are equally intelligent. Rather, it implies that all individuals have the ability to further develop his/her knowledge, skills, and abilities (Aditomo, 2015). Students with a fixed mindset equate failing to being a failure. Dweck (2006) offered another way of thinking, stating, “Even in the growth mindset, failure can be a painful experience. But it doesn’t define you” (p. 33). Students and teachers who adopt a growth mindset see intelligence as malleable, in that success and failure are not

validations of ability but part of the process that learners take to master new knowledge or skills (Aditomo, 2015; Boyd, 2014). Failure is “a problem to be faced, dealt with, and learned from” (Dweck, 2006, p. 33). Developing a growth mindset helps foster a positive attitude towards mistakes and failure. In a study of seventh graders in New York, researchers found that students with a positive incremental theory of intelligence, or a growth mindset, were more likely to use positive strategies in response to failure (Blackwell et al., 2007). Having a productive attitude about making mistakes and experiencing failure is an important result of developing a growth mindset and may help students be more successful in a competency-based system, a system in which mistakes and failures cannot be ignored, but instead must be faced head-on.

Impact of Growth Mindset on Students

Studies show that forty percent of U.S. students display a growth mindset, forty percent display a fixed mindset, and twenty percent have some growth characteristics and some fixed characteristics (Dweck, 2006). When students move from a fixed to a growth mindset because of a growth mindset intervention, they perform at higher levels in school almost immediately (Boaler, 2013). Students with growth mindsets perform better in challenging situations and on challenging cognitive tasks, score higher on IQ tests (Dweck, 2010a), and attribute failure to effort or faulty strategy, rather than lack of ability (Blackwell et al., 2007).

In a five-year longitudinal study of 373 seventh-grade student entering junior high in New York City, Blackwell et al. (2007) concluded that fixed or

growth mindset, as determined by a student survey, was a significant predictor of mathematics achievement.

In a study of 319 children in 32 schools in the United States, Stipek and Gralinski (1996) attempted to find a correlation between student mindset and academic achievement. They used a questionnaire to determine mindset and then compared mindset to report card grades. The researchers found that "children's beliefs about intelligence and performance were a powerful predictor of achievement outcomes" (p. 406). Beliefs about performance, or mindset, were significantly correlated to performance, especially for younger students (Stipek & Gralinski, 1996).

Similar to Stipek and Gralinski's (1996) research, West et al. (2016) used questionnaires to measure non-cognitive attributes, such as self-control, grit, and growth mindset, for more than 1,300 eight- grade students in 32 schools in Boston. The researchers found "new evidence that four prominent and widely used measures of non-cognitive skills are positively correlated with achievement gains on standardized tests among a large and diverse sample of eighth grade students attending distinctly different types of schools (West, et al., 2016, p. 164). Additionally, there was a significant positive correlation between the measures of non-cognitive attributes and student attendance and behavior.

Students who do not have a growth mindset can attain one with guidance and, subsequently, increase achievement. Theories of intelligence can be incorporated into real-world learning and impact achievement (Boyd, 2014). Research shows that interventions that help students increase their growth

mindset can positively affect the students' academic achievement and engagement in school (Blad, 2016a, p. 1). In a study of 91 relatively low achieving students, Blackwell at al., (2007) found that a majority of students who received a regularly scheduled 25-minute intervention, in which they were taught that learning changes the brain, showed a transition from a fixed to a growth mindset. The data indicated that, overall, math achievement was decreasing during junior high school. Students who had a fixed mindset and received the brain-based education intervention reversed their grade trajectories. Student-participants with a fixed mindset who did not receive the intervention continued to decline (Blackwell et al., 2007). Overall, over the course of the five-year study, students who endorsed growth mindset increased their math grades in comparison to those who endorsed a fixed mindset.

In a study of over 3,500 ninth-grade students from various schools around the United States, researchers implemented a two-session workshop in which students learned about the malleability of the brain and the ability to develop intelligence, and then participated in writing assignments to internalize the information (Yeager et al., 2016). The goal was to enhance student persistence and increase student desire to take on new challenges. The results of the study indicated that the two-session workshop raised the grades of the lowest performers and improved learning attitudes for both high and low performers (Yeager et al, 2016). The studies by Blackwell et al. (2007) and Yeager et al (2016) illustrate the effectiveness of growth mindset curriculum on student achievement.

Socioeconomic background and growth mindset. Research shows that mindset is particularly important for students who are often the targets of negative stereotypes (Dweck, 2010a). For some students, negative stereotypes can reinforce a fixed mindset. A growth mindset, however, allows students to recognize the disadvantages they face and helps them believe that they can overcome challenges through their own efforts (Dweck, 2010a). In a study conducted by Blackwell et al. (2007), in which the researchers focused on teaching low-income, low-achieving seventh graders about brain growth, they found that students showed a significant improvement in performance. Blackwell, et al.'s study shows that learning about brain growth can empower students.

Although all students can transition from a fixed mindset to a growth mindset and increase achievement, students from low-income households are more likely to have the greatest gains. Blad (2016a), for example, found that, "While students from low income families are less likely to have a growth mindset, their learning is affected more dramatically than their wealthier peers' when they adopt the approach to learning" (p. 10).

Claro et al. (2016) conducted comprehensive research of all tenth-grade students in Chile to determine the correlation between mindset and income. Their research showed that students from low-income households were twice as likely to have a fixed mindset, when compared to students from the highest income households. This fixed mindset had a more compelling negative impact on the lower income students, compared to their wealthier peers. Claro et al.'s

(2016) study showed that having a growth mindset could mitigate the negative consequences of income on academic achievement. They noted that, “Strikingly, students from low income families who had a growth mindset showed comparable test scores with fixed mindset students whose families earned 13 times more” (p. 4). Although this research does not suggest that teachers ignore societal inequalities, it does illuminate the fact that one way that teachers can help neutralize economic disadvantage is by effectively supporting students who face these challenges.

False growth mindset. It is important to note, however, that giving students unchallenging tasks and then praising them is not a growth mindset but a “false growth mindset.” Educators sometimes believe that if they give students tasks where students will likely succeed, they will experience higher levels of engagement and self-confidence. This is just not the case. Praising students for success on easy tasks sends the message that success does not require much effort (Masters, 2013). As Dweck (2006) argued, “Lowering standards just leads to poorly educated students who feel entitled to easy work and lavish praise” (p. 193). High expectations foster growth mindset; lowering expectations tells students that they are not capable of more complex work (Masters, 2014). Research suggests that real learning occurs when teachers give students tasks that challenge them outside of their comfort zone (Masters, 2013).

Although educators and parents are excited about growth mindset because they see it as a way to re-energize kids and shift the focus away from testing and back to learning, many have oversimplified the concept (Gross-Loh,

2016). Teachers often praise the effort of students, even if there is no progress. In her interview with Christine Gross-Loh (2016), Dweck indicated that educators cannot just focus on the effort and that students need to be able to see the connection between effort and the outcome, for growth mindset to occur. Educators and parents cannot just protect students' confidence. They must help students find strategies to overcome failure, in order to show them how the learning process, as well as hard work, can lead to success (Gross-Loh, 2016). As Blad (2016b) noted, "Equating growth mindset with a general sense of optimism, emphasizing sheer effort instead of teaching students to develop new learning strategies, and focusing on how they communicate with students rather than adapting broader classroom practices" are examples of false growth mindset (p. 10).

Grit

Several researchers have argued that having a growth mindset results in the development of grit (A. Duckworth, lecture, September 27, 2018; Hochanadel & Finamore, 2015). Grit is the amount of passion and perseverance a person has to work through problems to achieve a goal (Duckworth, 2016; Fitzgerald & Laurian-Fitzgerald, 2016). Fitzgerald and Laurian-Fitzgerald (2016) explained:

> People who are Gritty believe it is important to continue after a failure, have a drive to continually improve, never believe they have become good enough, are satisfied with being unsatisfied, maintain passion even in difficult times, and know what they want and go after it unceasingly. (p. 55)

Both grit and growth mindset emphasize working through difficult situations to grow and succeed. Like Dweck (2006), Duckworth (2016) also believes that there is more to student success than test scores. Successful people are passionate about their goals and have grit—the ability to persevere with a capital "P" through failures and over a very long period of time (A. Duckworth, lecture, September 27, 2018).

Duckworth (2016) developed a Grit Inventory and used it to conduct a study at West Point. She compared the scores of the Grit Inventory to the students' "Whole Candidate Score," which includes high school grades, IQ tests, SAT results, and physical fitness scores. She found that the Grit Inventory Score was a much better predictor of student success than the Whole Candidate Score and that high cognitive test scores did not outweigh non-cognitive abilities. Grit allows students to persevere when faced with significant challenges (Hochanadel & Finamore, 2015); knowing that they have the ability work through those challenges is growth mindset (Dweck, 2006).

Creating a Growth Mindset Curriculum

Research shows that teaching the students about growth mindset can help them develop a growth mindset. Thus, helping students develop a growth mindset may increase student success in our proficiency-based system at Truman. In a study of 91 students in New York, Blackwell et al. (2007) administered a growth mindset intervention to an experimental group over eight, 25-minute periods, for a total of 200 minutes of instruction. The control group did not receive the intervention. The results showed that the experimental group

endorsed a growth mindset more strongly after the intervention than before it, and that the group's post-intervention growth mindsets were significantly higher than the control group's.

Aronson, Fried, and Good (2002) studied the impact of a growth mindset intervention on college students against two control groups that did not receive the intervention. The students who received the intervention showed a clear increase in achievement while the control groups did not. This study was particularly interesting because African American students showed the greatest increase in achievement as a result of the intervention, which closed the achievement gap between African American and White students (Aronson et al., 2002).

Good, Aronson, and Inzlicht (2003) conducted a study in which seventh grade students received 180 minutes of growth mindset intervention in a mentor–mentee environment. The students who received the intervention had a significant increase in both mathematics and reading achievement. This study was also significant because the group who received the growth mindset intervention closed the gender gap that existed in mathematics achievement (Good et al., 2003).

Yeager et al. (2016) conducted a study that included over 11,000 ninth-grade students in various locations in the United States and Canada. The purpose of the study was to gauge whether a revised growth mindset curriculum outperformed a previous iteration, and whether the revised curriculum improved the students' grades. Because I could not acquire the revised curriculum used in

the study, I used the suggestions made by the students regarding what would make an effective curriculum. This study was interesting because the students received only two sessions of growth mindset intervention, yet their grades and learning-oriented attitudes improved (Yeager et al., 2016). I used this article as inspiration to create my own curriculum.

Existing Growth Mindset Curriculum

I researched several existing growth mindset curriculums and found that, although part of each of the materials had the potential to inform and engage students, there was not one individual program that accomplished all of my desired goals. The curriculum I evaluated was (a) Brainology (2017), an online growth mindset curriculum created by the company, Mindset Works, available for purchase through individual or group subscriptions; (b) *The Growth Mindset Coach*, (Brock and Hundley,2016), which provides teachers with monthly growth mindset lessons; (c) Khan Academy (2018), a website with free online growth mindset curriculum called LearnStorm 2018 (Khan Academy, 2018); and (d) a website called TrainUgly.com (Ragen, 2018), which, unlike the other resources, targets people that may be outside of education, such as athletes and business leaders.

Brainology. Brainology (Mindset Works, 2017) is online curriculum produced by Mindset Works. The company claims that the lesson plans are based on the ideas presented in Dweck's (2006) book, *Mindset*. The program offers different subscription levels for varying price-points. They also offer two programs geared towards different age groups; one is recommended for grades

4–9 and the other, for grades 7–12. I purchased one subscription of their program called Applied Brainology: Student Mindset Builder (Mindset Works, 2017) which is for students in grades 7–12. It costs $50 for a one-year subscription for one person.

The original Brainology curriculum consists of four units that take approximately 40 minutes to complete, for a total of 160 minutes. Although the website stated the curriculum was designed for grades 7–2, I felt that the content was quite elementary. The illustrations on the worksheets and the animations in the videos seemed juvenile and cartoon-like. Perhaps the content would be appropriate for seventh graders, but I didn't think tenth graders would be receptive to it. I did, however, pick out a video and a worksheet to incorporate into my Growth Mindset Unit. In that way, I was able to get the students' perceptions in addition to my own.

Donohoe, Topping, and Hannah (2012) conducted a study to find out if completing the Brainology curriculum would have an impact on students' growth mindsets. The study included thirty-three secondary students in Scotland. The researchers found that, because of the curriculum, students moved towards a growth mindset (although that change was not sustained when they conducted a follow-up).

The growth mindset coach. Brock and Hundley (2016) created a growth mindset curriculum that they separated into monthly activities meant to help students and teachers develop growth mindset thinking. Each month has a theme, such as "Everyone Can Learn!" and "A Goal Without a Plan is Just a

Wish" and the authors provide informational background to the instructor, lesson plans, and a list of supplemental resources. Although the authors did not provide guidelines about how long the lessons should take, I thought they would take about forty-five minutes each. This was probably the most valuable resource that I found. Although the lessons still seemed to be geared towards middle-school students, there were some ideas that I could adapt to older students and there was a great assortment of supplemental resources that I found useful and incorporated directly.

Khan Academy. Khan Academy (2018) is a free online educational website that offers thousands of instructional videos and lessons and works in conjunction with Dweck to create an online growth mindset curriculum called LearnStorm 2018. They have a curriculum geared towards different grade levels. For the purpose of this study, I reviewed the curriculum that was developed for high school students. The curriculum consists of eight activities and each activity is broken up into three parts, except the last activity, which only has two parts. The activities are set up as online modules for students to progress through and students can earn badges upon the completion of each activity. The activities consist of reading text and watching short videos. The majority of the text is either to inform or present scenarios for the students to evaluate and reflect on. The videos feature Carol Dweck, field experts, and other people who work at Khan Academy, as well as a couple of videos created by Khan Academy specifically for this curriculum. After reviewing Learn Storm 2018, I concluded that there was too much text to hold the interest of several of the student-

participants in my study. I imagined them just scrolling through the text and clicking “next.” In fact, I found myself doing that on a couple of occasions because the text just did not hold my attention. I also thought that the videos of the staff members at Khan Academy would not hold the student-participants attention. The students did not know the individuals, nor did the individuals necessarily have credentials that would make them experts. I knew from experience and research that student engagement was critical.

Although I did not use the Khan videos, I did use several of their ideas. I also got from the Khan website the idea to use videos of famous individuals who had to overcome challenges.

TrainUgly.com. Ragan (2018) developed a growth mindset curriculum and has it posted for free at http://www.TrainUgly.com. One interesting aspect of this curriculum is that it was not developed for use in schools. Rather, Ragan developed it to help adults and organizations learn about growth mindset and to help them develop a one in five steps. Each step provides a very brief introduction with a video or multiple videos. The videos and the entire website incorporate graphics meant to catch and hold the user’s attention. One of the videos even used quotes from celebrities that the student-participants know, which I thought would draw them into the video. The website also has approximately one hundred other resources ranging from quotes from popular authors to news stories about women’s professional volleyball. Overall, however, the lessons were too short. Reading a very short amount of text and watching a video lacked the interaction I was looking for.

Student engagement. Student engagement is critical in any curriculum, and student engagement was an important consideration in the development of the Growth Mindset Unit. In a survey of 2000 students nationally, researchers at Thomas B. Fordham Institute attempted to find out what engages students in school (Geraci, Palmerini, Cirillo, & McDougald, 2017). According to the results of the study, students reported feeling engaged when the teacher was genuinely excited about the subject and when the teacher provided emotional support. Sixty-one percent of students enjoyed lessons involving technology and ninety-two percent of students enjoyed time working collaboratively with their peers. Students also indicated that they were more engaged when they had choices. In a study conducted by Yeager et al. (2016), in which the authors interviewed students regarding their opinion of desired revisions to an existing growth mindset intervention curriculum, the students named several revisions that would increase their engagement. Students reported that a growth mindset intervention should include quotes from admired adults and celebrities, should include diverse writing exercises, and should be clear about why someone should grow one's brain. They also said they wanted less reading and more bullet point summaries, actual data from scientific research, and examples that were relevant to teenagers (Yeager et al., 2016).

Conclusion

In this chapter, I provided the historical context and the theoretical frameworks for the constructs of proficiency-based learning, growth mindset, and grit. I summarized research about the key tenants of growth mindset:

perseverance, intelligence and neuroplasticity, mistakes and failure, and the effects of growth mindset on student achievement. I explained grit and I made a connection between proficiency-based learning and growth mindset ideology. I reviewed and evaluated current growth mindset curriculum and identified ideas and resources that I incorporated into my Growth Mindset Unit. Lastly, within my review of curriculum, I provided research about student engagement and the importance of engagement in the development of the unit.

Chapter Three: Methodology

Introduction

Truman Academy adopted a proficiency-based education system that required students to continue to work on assessments that measured competencies or standards until mastery, but did not prepare the students for the expectations associated with the system. I believed that helping students move towards a growth mindset, which is a belief that knowledge and skills are developed through effort and hard work, might provide the support students needed to build the perseverance that a proficiency-based systems required. A growth mindset model emphasizes that success is sometimes difficult and requires practice and effort, that making mistakes is normal and good, and that perseverance is necessary to move past mistakes (Dweck 2006). A proficiency-based system likewise requires practice and effort in order to be successful. In such a system, if students make mistakes, they must persevere to move beyond those mistakes and continue to exert effort until they meet the desired competency.

The purpose of this study was to answer the following research question: "What are the perceptions of tenth-grade student-participants regarding a teacher-researcher developed Growth Mindset Unit?" In Chapter Three, I discuss the research design, participants, and research method.

Action Research Design

According to Mertler (2014), action research is “any systematic inquiry conducted by teachers . . . for the purpose of gathering information about how their particular schools operate, how they teach, and how their students learn” (p.4). Mertler (2014) suggested that teachers conduct action research to reflect on their own practices and to take a deeper look at their instructional methods with the goal of improving their understanding and effectiveness as teachers. Action research “is done by teachers for themselves” (Mertler, 2014, p 4). The benefit of action research over traditional research is that the target population is the teacher-researcher’s own students (Mertler, 2014). The goal of action research is to improve an aspect of educational practice immediately within one’s own classroom or school (Mertler, 2014). Another goal of action research is to implement social change. “Because education is a social practice, its techniques are not socially neutral. [Educators] need to have some understanding, influence over, and responsibility for the social conditions and outcomes of education” (Trippp, 1990, p. 165).

I conducted this study to describe and interpret the perceptions of nine tenth-grade student-who participated in a Growth Mindset Unit I designed based on the constructs of Dweck (2006). I used survey research to describe the mindsets of the student-participants both before and after implementation of the unit. I conducted semi-structured interviews in order to describe students’ explicit perceptions of the Growth Mindset unit and a focus group interview to gather feedback on revising the unit.

Teacher-Researcher

As the teacher-researcher in this study, I worked collaboratively with the students in my own advisory class. I have been a public school educator for nineteen years. I spent eleven of those years at another area high school and the last eight, at Truman. I currently co-teach tenth grade Modern World Humanities, an integrated English and Social Studies course that is required for graduation. I also teach college-level psychology and sociology classes to high school juniors and seniors and I am the advisor for the nine tenth-grade student-participants in this study, who are enrolled in a required advisory block.

Setting

I conducted the study in a small coastal community in southern Maine. The population of the entire community is just under 10,000 people, and the median income is $68,247 (“Quick Facts,” 2017). Ninety-five percent of the adult population graduated from high school and 42% have a bachelor’s degree or higher (“Quick Facts,” 2017). Ninety-three percent of the population identifies as White, 3.8% identify as Hispanic, 2.2% identify as Asian, and 0.4% identify as African American (“Quick Facts,” 2017).

The community is predominantly a middle-class community, although twenty-two percent of the families have household incomes that come from low-wage jobs and eight percent live below the poverty line (“American Factfinder,” n.d.). Businesses and service jobs that cater to seasonal tourism and a U.S. Navy shipyard are significant sources of employment in the community (“Kittery Economic,” 2017). Because of the thriving tourist industry, many of the available

jobs in this community are in the hospitality and retail industries (“Kittery Economic,” 2017). In 2012, the year of the most recent data, accommodations and food services generated over $40 million dollars for the community and retail sales brought in another $280 million (“Quick Facts,” 2017). The population of veterans is approximately 750 and veterans own 100 businesses in town (“Quick Facts,” 2017).

The research site was my own advisory classroom at Truman High School. Truman’s 264 students reflected the larger White, middle-class community. Eighty-six percent of the students at Truman identified as White and approximately 30% were eligible for free or reduced lunch under the National School Lunch Program (Collins, 2018; Infinite Campus, 2018). The student body was 48% female and 52% male; that number included a small but significant population of students who identified as transgender (Infinite Campus, 2018).

Seventy-eight percent of the students who participated in the study identified as White and approximately 30% received free or reduced lunch. Fifty-five percent of participants identified as female and 45% identified as male. Thirty percent of participating students had some connection to the Navy shipyard, either because they had a parent who was currently active in the military and was stationed at the shipyard, or had a civilian parent that was employed there. A full description of each of the nine students-participants follows. All names are pseudonyms.

1. Kimmy

Kimmy was a fifteen-year-old who self-identified as a female Hispanic/Latino. She had been coded as an English Language Learner (ELL), but was not currently receiving ELL services. Her parents owned a local restaurant. Kimmy wanted to make her parents proud but did not find school very engaging. Her pre-test survey indicated that she had a growth mindset score of 10, but her grit scale of 11 was below the median possible score and below the class average.

2. Michelle

Michelle was a fifteen-year-old who identified as a White, middle-class female. She enjoyed school and was a conscientious student. Her pre-test survey score of -9 indicated that she had a strong, fixed mindset, but she scored relatively high on the grit scale with a score of 17.

3. Teddy

Teddy was a fifteen-year-old who identified as a White male. He came from an upper-middle class household in which both of his parents were attorneys. He wanted to do well in school but lagged behind in executive functioning skills, which meant he struggled with planning, goal setting, and attention (Heward, Alber–Morgan, & Konrad, 2017). His pre-test survey score of 16 indicated that he held a strong growth mindset, the second strongest in the class. His grit scale score of 11 was below the median possible score and the class average.

4. Rebecca

Rebecca was a fifteen-year-old who identified as a White, upper-middle class female. She had a connection to the Navy shipyard, as her father was a senior ranking officer in the U. S. military. She enjoyed visual arts and was a conscientious student. On the pre-test survey, she exhibited a growth mindset with a score of 9, which was also the class average, but scored below the class average on the grit scale with a score of 12, the median possible score.

5. Joey

Joey was a fifteen-year-old who identified as a White male. His parents were divorced. He had received free or reduced lunch in the past. Joey did well in school, and he particularly liked Science, Technology, Engineering, and Math (STEM) classes. He did not like to make mistakes. Joey's pre-test survey score of 2 indicated that he had a mixed mindset, while his grit score of 19 was the second highest in the class.

6. Donna Jo

Donna Jo was a fifteen-year-old who identified as a White, upper-middle class female. Her family was associated with the Navy shipyard. Her pre-test survey score of 9 indicated that she had a growth mindset, and her grit score of 13 was average for the class.

7. Jesse

Jesse was a fifteen-year-old who identified as an Hispanic/Latino male. He qualified for free or reduced lunch. He had struggled to succeed in school in the past but wanted to be more successful moving forward. He loved basketball

and worked very hard to be successful at it. His pre-test survey score of 17 indicated that he has a strong growth mindset, and he scored very high on the grit scale with a score of 20, the highest in the class.

8. Stephanie

Stephanie was a sixteen-year-old who identified as a White, working class female. She was eligible to receive free or reduced lunch. She seldom appeared to be engaged in the advisory class. On her pre-test survey, she scored a 10, which indicated a growth mindset. Her grit score of 9 was below the class average.

9. Danny

Danny was a fifteen-year-old who identified as a White male. His family had an association with the Navy shipyard. Although he was successful in school, he often appeared to be unengaged in the advisory class. According to the pre-test survey, Danny's score of 4 indicated that he had a mixed mindset, and his grit score of 10 was below the class average.

Research Method

The purpose of this study was to describe the perceptions of nine tenth-grade student-participants who worked with me to design a growth mindset curriculum that was implemented as part of a daily advisory block. The advisory block was designed to build relationships between a faculty member and a small group of students and to target the students' affective domain. Because I wanted to design a unit that helped students understand the brain, made connections to proficiency-based learning, and that students found engaging, I wanted to

collaborate closely with a group of students, as I knew that their feedback would be relevant and valuable. Additionally, because tenth-grade students had been in the system for a year, they would be able to look back on their experience reflectively in order to make connections between proficiency-based learning and growth mindset. After the implementation of the Growth Mindset Unit, the student-participants and I collaboratively reviewed and revised the unit during semi-structured interviews. I then revised the primary curriculum and again shared it with the students during a focus group session in order to extend our collaboration. I solicited their feedback and asked for suggestions for further revisions, as part of the iterative action research process.

This study incorporates observations, interviews, focus group discussion, and a pre- and post-test survey to allow for the polyangulation of the primary data set. The study began with a pre-test survey. I then implemented the Growth Mindset Unit over a four-week period, gave a post-test survey at the end of the unit, and followed up by conducting individual interviews with the student-participants. I revised the unit based on the students-participants' feedback and led a focus group to discuss the revisions.

Design of Study

I administered a pre-test survey to gather demographic information and to learn about the student-participants' mindsets and level of grit prior to the implementation of the Growth Mindset Unit. Over the next four weeks, I implemented the unit with student-participants during the advisory class they had each day at 10:17. At the conclusion of the unit, I gave the survey a second time

in order to document any changes in student-participants' mindsets and grit level. I interviewed the student-participants individually to evaluate their perceptions of the Growth Mindset Unit, and I recorded the interviews for accuracy. I then revised the unit based on the student-participants' feedback and presented it to them in a narrative format. The student-participants again provided feedback in a focus group discussion.

Survey design. To measure student-participants' baseline mindsets, I gave them a quantitative questionnaire-style survey (see Appendix A). The survey was an electronic form that students filled out using their school-issued laptops. The benefit of a survey is that the teacher can gather information quickly and all participants can complete the survey at the same time (Mertler, 2014).

Dweck (2006) and Duckworth (2017) created survey questions, which they used to show the impact of grit and the development of growth mindsets (Blad, 2016b; Fitzgerald & Lauren-Fitzgerald, 2016). Dweck used her growth mindset survey in a study involving 168,000 tenth graders in Chile and Duckworth used hers survey in studies involving students entering West Point, businesses, spelling bee contestants, and others (Blad, 2016b; Fitzgerald & Lauren-Fitzgerald, 2016; Claro et al.; 2016; Duckworth, 2016). Both researchers used closed response rating scales in which participants responded to statements. As Mertler (2014) explained, "Rating scales are appropriate when asking individuals to respond to a set of questions where their response indicates the strength of that response." Rating scales are an effective way to translate abstract concepts

like self-esteem, into quantitative data (Trochim 2006). Dweck (2006) used a set of statements and participants responded using a Likert scale. A Likert scale "begins with a statement and then asks individuals to respond on an agree/disagree continuum" (Mertler, 2014). In Dweck's (2006) survey, she asked participants to respond to statements using a five point scale, ranging from strongly agree to strongly disagree. I chose six Likert scale statements from Dweck's (2006) survey that I thought represented the statements in the survey as a whole:

1. A person is born with a certain amount of intelligence (IQ) and that doesn't change.
2. A person can increase his/her intelligence (IQ) significantly during his/her lifetime.
3. Although a person can learn new things, his/her intelligence (IQ) doesn't really change.
4. Learning new things can change a person's intelligence (IQ) significantly.
5. No matter how high a person's intelligence is (IQ), that person can always become more intelligent.
6. Some people have intelligence (IQ) that is so low, they cannot increase it. (Dweck, 2006, pp.12–13).

Duckworth (2017) used a Likert-like scale to measure a participant's grit. A Likert-like scale also measures a participant's responses on a continuum, but measures something besides agreement or disagreement (Mertler, 2014). In her

Grit Scale, Duckworth (2017) measured how much the statements related to the participant using a five-point scale, ranging from “very much like me” to “not like me at all.” I chose statements that I thought represented groups of statements that were similar to Duckworth’s (2017) original scale. The Grit Scale survey as I presented it to the student-participants included:

1. Setbacks don’t discourage me. I don’t give up easily.
2. New ideas and projects sometimes distract me from previous ones.
3. I am a hard worker.
4. I have difficulty maintaining my focus on projects that take more than a few months to complete.
5. I finish whatever I begin.
6. I have overcome setbacks to conquer an important challenge.

(Duckworth, 2017, p.1)

The student-participants’ responses to these statements allowed me to describe their mindsets and levels of grit before I implemented the Growth Mindset Unit. My expectation was not that the Growth Mindset Unit would change their mindsets in its early iteration; rather, I wanted to be able to describe any changes if this did occur.

I administered the pre-test survey before the start of the Growth Mindset Unit. I created the survey using Google Forms and distributed it to the student-participants using our advisory Google Classroom platform. The student-participants used their school issued laptops to take the survey.

Growth mindset unit design. Developing aspects of a curriculum to promote growth mindset is not a novel idea. For this study, I reviewed several previously existing curricula. I determined the benefits and drawbacks of each and adapted aspects of some to design my Unit. Mindset Works designed a web-based growth mindset curriculum called Brainology (Mindset Works, 2017) that is based on Dweck's (2006) educational theory. Donohoe et al. (2012) studied the effectiveness of this material to determine the impact of the Brainology curriculum on the mindsets of students in a secondary school. They found that, although the students initially moved towards a growth mindset after using Brainology, they did not seem to enjoy the program (Donohoe et al., 2012). Because this study was six years old, I wanted to review the program to see if there were updates that might make the program more engaging to students. With this in mind, I reviewed the Applied Brainology program (Mindset Works, 2017), which Mindset advertises as suitable for grades 6–12. However, I found the content to be elementary; I thought the animations in the video lessons were childish and the worksheets were very basic. I incorporated one lesson, Lesson 9 from Module 4, in case the students perceived the material differently than I did. This lesson used one of the Mindset Works videos and the worksheet that corresponded to the video. I had intended to use Mindset's activity around the website "Give It 100," but that website had been removed. I also used a TEDx talk by Dr. Tae (TEDx Talks, 2011), a resource suggested in the Applied Brainology curriculum.

Brock and Hundley (2016) also created lesson plans for educators to use in their classrooms and incorporated these lessons into a month-by-month program that includes research-based activities and hands-on lesson plans. Although the activities were interesting and I thought the student-participants would think so too, many of the lessons required more time than we had available. I did, however, use the ideas and resources as inspiration for a couple of my lesson plans. The book had a chapter called “Meet Your Brain,” which inspired the Brain Scavenger Hunt that I designed for the student-participants as a way of introducing them to the parts and function of the brain (Brock & Hundley, 2016). The chapter called “A Goal Without a Plan is Just a Wish” gave me the idea to show the students examples of famous individuals who faced failure and persevered (Brock & Hundley, 2016).

I decided that Khan Academy’s (2018) growth mindset curriculum was too text heavy. I did not think the text-based lessons would hold the attention of the student-participants. There were three videos from that curriculum that I incorporated into the Growth Mindset Unit. One of the videos depicted an interview between Khan and Dweck that outlined the difference between a growth mindset and fixed mindset. Another video was called “You Can Learn Anything” and was short video meant to have a big impact. The last video was a video featuring John Legend that explained how he persevered through his failures to become a successful singer.

Ragan’s (2018) TrainUgly.com featured a growth mindset curriculum that was not designed for a school setting. This website contained mostly videos and

I incorporated the video called “Growth Mindset Introduction: What it is and How it Works,” which offered a clear differentiation between fixed and growth mindset characteristics and used images and graphics that I thought the student-participants would find appealing.

Growth mindset unit sequence. The resources I researched provided potential frameworks for the sequence of the Growth Mindset Unit. Brock and Hundley (2016) was the most influential when I developed my own sequence (see Figure 3.1).

Important considerations when creating the unit. When creating the Growth Mindset Unit, I considered several factors. One of the biggest issues was the timeframe. The pre-existing growth mindset curriculums that I reviewed ranged from 140 minutes to 200 minutes. To incorporate the Growth Mindset Unit into the advisory class, I designed a unit of 20 sessions that took place over a period of four weeks.

Additionally, I needed to create a unit that was engaging for students. In a study by Yeager et al. (2016), students indicated that a growth mindset intervention should include diverse writing exercises, quotes from admired adults and celebrities, and that it should make clear why someone should grow one’s brain. They also wanted minimal reading, actual data from scientific research, and examples that were relevant to teenagers (Yeager et al., 2016). I considered these suggestions when designing the unit. I attempted to provide diverse writing exercises by using a variety of worksheets and writing prompts. I included the experiences of Michael Jordan, John Legend, and JK Rowling as

the admired celebrities. I also included two scientific studies and I used a TED Talk that illustrated perseverance, using skateboarding as an example, which I thought might be relevant to teenagers (see Appendix B).

Post-growth mindset unit survey. Upon completion of the Growth Mindset Unit, I administered the post-test survey (see Appendix C). The format of the post-test survey was the same as the growth mindset section of the pre-test survey except I did not include the demographic section or the grit section, as I did not design the unit to develop grit. I formatted the survey using Google Forms and distributed it using Google Classroom. The student-participants again used their school-issued laptops to complete the survey.

Interview design. The major goal of this study was to determine my tenth-grade student-participants' perceptions of a Growth Mindset Unit. In order to determine their perceptions, I conducted individual semi-structured interviews with each student-participant. I scheduled the interviews during Focused Intervention Block, which was a period during the school day when teachers could schedule to meet with specific students by using a shared spreadsheet. The Focused Intervention Block was approximately 30 minutes long and I scheduled two interviews per block. Only one student-participant was in the room during the interview. I presented the student-participants with open-ended questions that allowed for follow-up and I recorded their responses for accuracy (see Figure 3.2 for pre-determined questions). The follow-up questions were based on the student-participants' responses and were thus unique to each participant.

Revision. I coded the student-participants' responses and analyzed them for patterns and themes and I used what I learned to revise the unit. I then presented the revised curriculum to Focus group. The student-participants and I discussed the revised curriculum in a focus group setting. The questions I asked were:

1. What do you think of the revised Growth Mindset Unit?
    a. What would you add?
    b. What would you subtract?
2. How do you think future students will perceive this curriculum?
3. In what ways do you think this curriculum will be helpful to other students?.

Data Analysis

I analyzed the test data and exported it into a Google spreadsheet. I devised a method to make the Likert and Likert-like responses into a numerical score to express the student-participants' growth mindset and grit levels. This made it easier to compare student-participants' growth mindset scores on the pre- and post-tests. I then organized the results into a table.

I recorded the interviews, then listened to and transcribed them. After transcribing the interviews, I coded the responses to find themes. The two major themes I drew from the coding were (a) connections to proficiency-based learning and (b) student engagement. I used the connection to proficiency-based learning to answer the research question regarding the student-participants'

perception of the unit and I used the theme of student engagement to revise the unit, so I could implement it in all advisory classes.

I used the student feedback to revise the Growth Mindset Unit plan. I created a student-friendly outline of the Growth Mindset Unit that included images of the videos and programs that remained in the unit, as well as the questions and writing prompts to be used (see Appendix D). I presented the revisions to student-participants during the focus group discussion, which I then transcribed and coded for the same themes. The student-participants were not very talkative in the focus group discussion so the additional transcription was limited. I also used the student-participants' responses in the focus group discussion to develop the rationale for my action plan (see Chapter Five).

Ethical Considerations

Mertler (2014) cautioned that, "Making sure that action research adheres to ethical standards is the primary responsibility of the educator-researcher" p. 106). Trochim (2006) identified several ethical protections for research participants, including voluntary participation, informed consent, and confidentiality. According to Trochim (2006), "prospective research participants must be fully informed of the procedures and risks involved in research and must give their consent to participate" (para. 4). Accordingly, the Truman school district requires teacher-researchers who intend to conduct action research within their classroom to inform parents of the research being conducted ("Educational Research," 2012).

Because informed consent is an important aspect of ethical research, I informed the student-participants and their parents of the study (see Appendix E). As part of the informed consent and voluntary participation procedure (Trochim, 2006), I further explained to the student-participants and their parents that participation was optional and I gave them and their parents the opportunity to opt out of the research, as part of the informed consent and voluntary participation procedure.

Additionally, I guaranteed confidentiality to parents and student-participants during the survey process and anonymity when I reported the results of the action research. Confidentiality ensures that "identifying information will not be made available to anyone who is not directly involved in the study" (Trochim, 2006, para.4). Although anonymity was not part of the survey procedure because I was recording changes that occurred on an individual level, I kept those recordings confidential and reported the results anonymously.

I based my study on the principle of beneficence, which states, "research should be done in order to acquire knowledge about human beings and the educational process" (Mertler, 2016, p.112). The goal of the study was to benefit students, teachers, and the learning process, and it carried little or no risk of harm to the student-participants, either physically or emotionally. .

Conclusion

I conducted this study to determine my student-participants' perceptions of a Growth Mindset Unit. The goal of the study was to create a curriculum that could be used with other students to teach them about growth mindset. The

primary data set included individual semi-structured interviews of all nine student-participants and focus group discussion results, which I polyangulated with observations and a pre- and post-test survey.

I delivered the Growth Mindset Unit over four weeks and solicited feedback via individual semi-structured interviews. I coded the student-participants' responses for patterns and themes and used these to revise the curriculum. I presented the revised curriculum to the student-participants in a focus group to elicit additional feedback as part of the iterative research process.

Growth Mindset Unit Implementation

1. The Brain and Its Function
    a. Brain Scavenger Hunt
    b. Neurons
2. Neuroplasticity
    a. Impact of Beliefs on Learning
    b. Learning Leads to More Learning
    c. Mistakes and Brain Growth
    d. Impact of Experiences on Intelligence
3. Checking for Understanding—Kahoot!
4. Growth vs. Fixed Mindset
    a. Sal Khan and Carol Dweck
    b. Growth vs. Fixed Mindset by Sprouts
    c. Introduction to Growth Mindset by TrainUgly.com
5. Growth Mindset in the Real World
    a. Michael Jordan
    b. John Legend
    c. JK Rowling
6. Connecting Growth Mindset to Proficiency-Based Learning
    a. Writing Prompt
    b. Dr. Tae
7. Using the idea of Growth Mindset to Build Grit
    a. Karen X. Cheng

Figure 3.1. Implementation of Growth Mindset Unit

Predetermined Interview Questions

1. What do you think of the Growth Mindset Unit that we have been working on?
2. What activity/activities did you like best?
    a. Why did you like that activity best?
    b. What did you learn from it?
3. What activity did you like least?
    a. What didn't you like about that activity?
    b. How would you have changed it to make it better?
4. How do you think you have changed as a student because of this unit?
5. In what ways do you think developing a growth mindset can help students be successful in a proficiency-based system?
6. Do you think this unit would be valuable for other students? Why or why not?

Figure. 3.2. Individual semi-structured interview questions

Chapter Four: Results

Introduction

Chapter Four includes the findings and implications for my study, which was designed to describe nine high school student-participants' perceptions of the Growth Mindset Unit I designed and implemented in a regularly scheduled advisory class block over the course of four weeks in the fall of 2018. I sought student-participants' feedback in order to improve the curriculum and pedagogy for future implementation of the unit. The school district in which these student-participants reside adopted a proficiency-based education system that required students to continue to work on competencies until they attained mastery. However, the district did not provide scaffolding to prepare the students to be successful in this system. My goal with the unit was to help the student-participants move towards a growth mindset.

The question guiding this study was: "What are the perceptions of nine tenth-grade student-participants regarding a teacher-researcher developed Growth Mindset Unit?"

Data Collection Strategy

I used three data collection sets that allowed for the polyangulation of the data, with the intention of providing me with a more accurate analysis of the study (Mertler, 2017). The primary data collection set included the interviews of all nine tenth-grade student-participants regarding their perceptions of the

Growth Mindset Unit, as well as focus group discussion results. Because the sample size was small, I recorded and separately analyzed the responses of all nine student-participants. I polyangulated this data with the Likert and Likert-like scale surveys that the students completed before and after implementation of the unit.

I notified parents and student-participants about the study via an electronic letter sent through Truman's electronic messenger located in the Infinite Campus software (see Appendix E). I explicitly explained to the student-participants and their parents the role the participants would take in the study and gave them the opportunity to opt out.

I began my research with a survey to determine student-participants' demographic information and their mindsets prior to the presentation of the Growth Mindset Unit. I distributed the survey during the advisory class on September 10, 2018 via Google Classroom using Google Forms, and the student-participants used their school-issued laptops to complete it (see Appendix A).

To ensure confidentiality, I assigned each student-participant a number and a pseudonym and I coded their responses under their pseudonyms. I then presented the Growth Mindset Unit to the student-participants during a regularly scheduled advisory block over four weeks, from September 12, 2018 to October 16, 2019. On October 17, 2019, I gave the student-participants the post-test survey. The survey did not include the demographic information that was

included on the pre-test survey, but it did include the same questions about growth mindset.

Additionally, after the completion of the Growth Mindset Unit, I interviewed each student-participant individually, in my classroom between October 23, 2019 and November 1, 2019. With the student's' permission, I recorded all nine interviews and transcribed them. I used the data from the surveys and interviews to revise and redesign the unit. I then presented the modified unit to the student-participants in narrative form and elicited feedback in a focus group that took place in my classroom during an extended advisory class. I used this secondary feedback to refine the unit a second time.

Ongoing Analysis and Reflection

My early data analysis focused on the pre-test survey, which I administered before implementing the Growth Mindset Unit.

Student-Participant Mindsets

Of particular surprise to me was the number of student-participants who began the study with a growth mindset. Dweck (2006) indicated that approximately 40% of students have a growth mindset, 40% of students have a fixed mindset, and 20% of students have a mixed mindset. In my group of student-participants, 67% had a growth mindset, 22% had a mixed mindset, and 11% had a fixed mindset.

Growth Mindset v. Grit

According to the student-participants' responses on the pre-test survey, a student's mindset did not necessarily predict his or her perceived level of grit.

For example, the one student-participant that showed a clear fixed mindset had one of the highest scores for their perceived level of grit. And two of the student-participants with the strongest fixed mindsets had two of the highest grit scores. Of the six student-participants with scores that supported a growth mindset, five student-participants had grit scores below the class average. I had anticipated that there would be a closer correlation between a student-participant's mindset and his or her perceived level of grit. (See Table 4.1.)

Reflective Stance

The purpose of my study was to describe student-participants' perceptions of the Growth Mindset Unit in order to design a curriculum that was informative and engaging for students. It may have been beneficial if I had broken the unit up into between two and four parts and had interim interviews with the student-participants. That would have allowed me to make meaningful changes and assess those changes over the course of the study, making it more iterative instead of waiting until the end of the unit to assess and make changes. Doing this may also have helped the student-participants recall activities while they were still fresh on their minds.

The focus group to review the revisions of the unit was not as productive as I had hoped. I found that the students were reluctant to answer the questions. When I was transcribing the focus group, my voice was certainly the most dominant. When the student-participants did respond, they were able to build on each other's answers, but getting that conversation going was difficult.

Data Analysis, Interpretation, and Coding

I collected data in a variety of ways. I used a pre- and post-test survey to collect demographic data and to measure the student-participants' mindsets and levels of grit, I conducted semi-structured interviews of each student, and I facilitated a focus group discussion.

The Pre-Test Survey

The pre-test survey had three sections. I used the first section to gather demographic information about each student-participant, including how they identified their race and gender. I used some of the questions to gather information about socioeconomic status, as this information was not available to teachers. In the second section, I used six questions from Dweck's (2006) survey in order to determine the student-participants' mindset. In the third section, I used six questions from Duckworth's (2017) Grit Scale in order to determine the student-participants' level of grit.

The results of the first section showed that seven of the nine student-participants identified as White and two of the nine students identified as Hispanic/Latino. Five of the student-participants identified as female, and four identified as male. Based on the students' responses regarding shipyard affiliation and eligibility for free or reduced lunch, I knew that three of my students fit the federal definition for low socioeconomic status. Three of the student-participants had an affiliation with the local shipyard and three indicated that they were or had been eligible to receive free or reduced lunch.

Truman participates in the National School Lunch Program (NSLP); historically, schools have relied on eligibility for this program to identify socioeconomically disadvantaged students (National Forum on Education Statistics, 2015). In an effort to expand this definition, the National Forum for Education Statistics (2015) stated:

> SES can be defined broadly as one's access to financial, social, cultural, and human capital resources. Traditionally, a student's SES has included, as components, parental educational attainment, parental occupational status, and household or family income, with appropriate adjustment for household or family composition. An expanded SES measure could include measures of additional household, neighborhood, and school resources. (p. 4)

Applying the NSLP eligibility and traditional SES definition to the students-participants' own descriptions of their families, environments, demographics, and receipt of free or reduced lunch, meant that three of the nine student-participants in my sample group fit the designation of economically disadvantaged and low socioeconomic status. See Table 4.2 for student demographic information.

The second section focused on the mindsets of the student-participants prior to the Growth Mindset Unit. I selected six Likert scale questions from the growth mindset survey developed by Dweck (2006). The Likert scale had six possible selections ranging from "strongly agree" to "strongly disagree." I gave each selection a point value. If the selection was related to a growth mindset, I gave it a positive score of 1, 2, or 3. If the selection was related to a fixed

mindset, I gave it a negative score of -1, -2, or -3. I then added the points together. I assigned each of the mindsets—fixed mindset, mixed mindset, and growth mindset—a twelve-point range. A score in the range of -18 to -7 indicated a fixed mindset, a score of -6 to 6 indicated a mixed mindset, and a score of 7–18 indicated a growth mindset. The results of the second section of the pre-test survey indicated that only one student-participant had a fixed mindset at the beginning of the study. With scores of 2 and 4, two student-participants were categorized as having mixed mindsets. The other six student-participants began the study with growth mindsets. The class average of 7.556 fell into the mixed mindset range. See Table 4.3 for individual growth mindset scores. See Table 4.4 for a summary of the student-participants' responses to each growth mindset prompt.

The third section of the pre-test survey focused on the grit rating of each student-participant. I chose six closed response statements from Duckworth's (2017) Grit Scale. The Likert-like scale had five possible responses ranging from "Very much like me" to "Not much like me at all." The response that was the furthest from indicating grit, I assigned a score of 0. As the responses moved towards increasing grit, I assigned a score of 1 through 4. The student-participants could have a score that ranged from 0 to 24. The results of the survey indicated that the class average was 13.556. I described student-participants below the class average as having a low grit score. I described student-participants above the class average as having a high grit score. Six student-participants scored below the class average, although one was just

barely, and three student-participants were above the class average. There was little correlation between grit score and mindset. The student-participants with the two lowest mindset scores had two of the highest grit scores. The student-participant with the second highest mindset score had a below average grit score. The student-participant with the highest growth mindset score also had the highest grit score. See Table 4.5 for a summary of the student-participants' responses to the grit rating portion of the survey. For a complete summary of responses, see Table 4.6.

The Post-Test Survey

The post-test was identical to the Growth Mindset section of the pre-test survey except for two things: (a) the demographic information did not need to be collected again, and (b) although the action plan for the present study included a project meant to help grow students' grit, the study did not include the implementation of strategies to increase grit, so the grit scale was not included. (See Appendix C.)

I distributed the post-test survey to the students on October 17, 2018 via Google Forms. The student-participants completed the survey using their school-issued laptops during the regular advisory class timeframe.

The survey results indicated that the class average for growth mindset increased from a score of 7.556 to a class average of 11.889. This indicates that the class as a whole began the unit with a mixed mindset and ended the unit with a growth mindset. There was a significant movement from fixed mindset thinking to growth mindset thinking on two of the prompts. On the pre-test, 22% of

student-participants disagreed with the statement that “A person can increase his/her intelligence (IQ) significantly during his/her lifetime.” Another 22% only somewhat agreed with the statement. On the post-test survey, 89% of student-participants agreed with or strongly agreed with this statement, which showed a better understanding of the attributes of growth mindset. Regarding the prompt, “Although a person can learn new things, his/her intelligence (IQ) doesn't really change”, 33% of the student-participants agreed on some level with this statement and 11% somewhat disagreed. On the post-test, all of the student-participants were in disagreement with the statement, which also showed a shift by the class towards growth mindset. (See Table 4.7.)

Individually, all of the student-participants experienced a change in their mindset scores between the beginning and the end of the study. Three student-participants decreased their scores and six increased theirs.

Three of the student-participants’ scores decreased after participating in the Growth Mindset Unit; two remained in the growth mindset range even after the drop, and one dropped from a growth mindset to a mixed mindset. Teddy and Jesse experienced a score decrease but still remained in the growth mindset range. Jesse had the highest growth mindset score and his score decreased by one point, from 17 to 16. Teddy had the second highest growth mindset score and his score decreased by two points, from 16 to 14. The most concerning drop belonged to Kimmy, who began the study with a growth mindset score of 10 and ended the study with a mixed mindset score of 6.

The remaining six student-participants' scores increased. Three of the students: Rebecca, Donna Jo, and Stephanie, began the unit with a growth mindset. Donna Jo and Stephanie's scores increased one point, from 9 to 10 and 10 to 11, respectively. Rebecca's score increased from 9 to 14, a fairly significant increase of 5 points. Two student-participants, Joey and Danny, started with mixed mindset scores and ended with growth mindsets. Joey's mixed mindset score of 2 increased to a growth mindset score of 11. Danny's mixed mindset score of 4 increased to a growth mindset score of 12. Michelle's score changed the most. She began the study with a fixed mindset score of -9. After the Growth Mindset Unit, she had a growth mindset score of 13, a significant gain of 22 points. See Table 4.8 for individual student-participant score changes.

Semi-Structured Individual Interviews

At the conclusion of the Growth Mindset Unit, I interviewed each student-participant individually in the privacy of my classroom. I began the interview with a broad question, "What did you think of the Growth Mindset Unit we just completed?" and became more specific and more focused on the student-participant as the interview continued. I recorded the interviews with the permission of each student-participant, and stored the recordings on my password-protected laptop.

I transcribed and coded the interviews using the process of concept-driven coding (Mertler, 2017). Through coding and subsequent synthesis and categorization, two dominant themes emerged: (a) growth mindset and

proficiency-based learning, and (b) student engagement. Within the domain of growth mindset and proficiency-based learning, I reported student-participants' perceptions of the value of growth mindset as it relates to proficiency-based learning. Additionally, I described student-participants' perceptions of the tenants of growth mindset, including neuroplasticity, mistakes and failure, and effort and perseverance.

Within the student engagement theme, I evaluated student-participants' perceptions of the activities and materials used in the unit. The student-participants suggested activities and materials that I should remove from the unit because they were not engaging; they indicated activities and materials that they found engaging and which should remain part of the unit; and they provided ideas for activities and materials that I should add.

Growth mindset and proficiency-based learning. The intent of this study was to describe the perceptions of the nine student-participants regarding the Growth Mindset Unit. In order to do this, I had to be sure that the student-participants understood the content I was presenting to them.

Knowledge of neuroplasticity. Neuroplasticity means that the brain has the capacity to change its structure through the process of learning and problem solving (Masson & Brault Foisy, 2014). New learning creates new synaptic connection throughout a person's life (Bryck & Fisher, 2012). This idea is foundational to Dweck's (2006) educational theory of growth mindset. Six of the student-participants were able to effectively describe neuroplasticity in their own words. Joey said that "neuroplasticity is the way your brain forges new pathways

between neurons" and Donna Jo said, "Neuroplasticity is your brain's ability to change and acquire new connections." Rebecca expanded on these ideas by saying "The brain continues to learn, even as we grow older, growing and strengthening connections that we use frequently. Those that we use less get pruned." The remaining three students had elements of the definition, but were unable to provide a cohesive definition of neuroplasticity. For example, Danny said, "Neuroplasticity is the ability for your brain to gain neurons, and remove unnecessary neurons," which is incorrect. Neuroplasticity is about connections between neurons, not establishing new neurons.

During the interviews, several student-participants highlighted neuroplasticity as a concept that they found interesting. Michelle "really liked" learning about neuroplasticity; it was something she had no knowledge of before. She indicated that it really had an impact on her view of people's ability to grow their brains. The results of her pre- and post-test survey supported her claim because she showed the greatest movement from a fixed mindset to a growth mindset. Teddy found the information about how the brain grows with new experiences to be really interesting, too, "Because it showed that if you have better learning opportunities, you can really improve your overall intelligence."

Attitudes towards mistakes and failure. Boaler (2013) argued that mistakes are important opportunities for learning and brain growth. Although students often regard mistakes as indicators of inability, every time a student makes a mistake, new synapses form in their brains from thinking about those

mistakes. She argued that students and teachers should value mistakes as important learning experiences (Boaler, 2013).

As part of the Growth Mindset Unit, I showed the student-participants a TEDx Talk by Boaler (TEDx Talks, 2016) in which Boaler explained that making mistakes could actually make a person's brain grow stronger. This made an impact on several student-participants who mentioned it in their interviews. Donna Jo reiterated, "You must be able to have a growth mindset and learn from your mistakes." Rebecca indicated that, "With a growth mindset, someone will be able to make mistakes . . . learn from those mistakes." Danny also mentioned this TEDx Talk in his interview. He interpreted Boaler's message to be that people who make mistakes and learn from those mistakes actually become smarter than people who get it the first time. He said that he thought that was pretty interesting.

Perspective on failure is another important aspect of growth mindset. Students with a fixed mindset see failure transform from the action of failing to the identity of being a failure (Dweck, 2006). Students and teachers who adopt a growth mindset see failure as part of the process that learners take to master new knowledge or skills (Aditomo, 2015; Boyd, 2014). Even with a growth mindset, failure is not favorable; however, it is viewed as a part of the learning process, and seen as something one can overcome (Dweck, 2006). The student-participants addressed failure in their interviews. Kimmy said that the value of a growth mindset was that students will keep trying, even if they failed. Joey said, "If you fail once, that doesn't mean you can never fix it, and over time,

you can improve." Danny said, "Right now, you just feel like you have done something wrong, but like with this, it kind of just teaches you that it's just part of how you learn." Donna Jo thought that having a growth mindset would allow students to, "Take [their] failures and turn them into a success."

Attitudes towards effort and perseverance. Effort is an important aspect of growth mindset (Dweck, 2006). Within Dweck's (2006) construct, effort and perseverance are critical components of developing a growth mindset. Students with a fixed mindset are more likely to give up in the face of a challenge but students with a growth mindset are more willing to put in the extra time and effort in order to achieve a goal (Robinson, 2017). Grit is the amount of perseverance a person has to work through problems to achieve a goal (Duckworth, 2016). Both grit and growth mindset emphasize working through difficult situations and persevering through failures, but grit also focuses on persevering over a very long period of time (A. Duckworth, lecture, September 27, 2018).

Within the Growth Mindset Unit, the student-participants were exposed to the stories of several individuals who showed effort and perseverance to accomplish a goal. Three student-participants identified those stories as being of particular interest. Although 8 of the 9 student-participants indicated that they had a difficult time staying focused on long-term projects on the grit scale survey, several of them were able to identify a time when they showed perseverance on a long-term task. Michelle spent four years learning to ride a horse, Donna Jo spent more than five years learning to juggle a soccer ball effectively, and

Stephanie spent two years learning to play the flute. Additionally, all nine of the student-participants showed a sincere interest in working on a long-term project of their choice as a way of building their perseverance and grit.

Several of the student-participants acknowledged that practice played a significant role in their learning. Donna Jo indicated that practice played a significant role in improving her juggling skill: “Ever since I was young, I have practiced my juggling skills and I have shown great progress over time.” Danny connected practice to math ability. He expressed that, “If I think I am good at something, I don’t ever practice it more.” The John Legend video helped him to realize that if he continued to practice, he could become even better: “In math, I would think that I got it, but then the final would come around and I should have kept practicing at it to try and get better instead of just thinking I had it.”

Perception of growth mindset on proficiency-based learning. Dweck (2010) supported proficiency-based learning, or mastery learning, because students receive credit for the effort and perseverance they show to overcome their mistakes and their failures in order to meet competencies. Bloom (1968), Carroll (1963), and Dweck (2010) all asserted that perseverance is a key component to proficiency-based learning, and that if a student perseveres to master one task, that student will be more likely to persevere in other tasks.

All nine student-participants thought that developing a growth mindset could be helpful to students in a proficiency-based system of learning. Although Joey did not feel it would be helpful to him specifically because it was the rigor of the work that he needed to adjust to, not the proficiency-based model, he did see

how it would be beneficial to others. He told me, “If you fail once, that doesn't mean you can never fix it, and over time, you can improve. That system lines up with a growth mindset almost perfectly, so I can see why it would help.”

Others could see how developing a growth mindset would be particularly helpful with accepting mistakes and failures, and having a positive attitude about revising work in order to meet the competencies. Danny thought, “A growth mindset would be a good trait for someone in this system because it is extremely hard to be proficient in every competency, but with this mindset, and never giving up, it would make it a little bit easier.” Kimmy hypothesized that students would “keep on trying even if they fail.” Teddy agreed, stating, “Your first try shouldn’t be your final try.” Prior to the Growth Mindset Unit, Michelle thought, “that when I had to make up stuff I wouldn’t really get better.” She indicated that the unit helped her to realize that she really can grow from having to revise. Regarding making mistakes without a growth mindset, Danny said, “You just feel like you have done something wrong.” But a growth mindset perspective, “kind of just teaches you that it’s just part of how you learn.” Rebecca corroborated that growth mindset helps students understand their growth in a proficiency-based model: “With a growth mindset, one will be able to make mistakes, learn from those mistakes, and reassess on assignments to grow.” Growth mindset, according to the student-participants, could also help students develop a positive attitude towards revising their work. Referencing proficiency-based learning (PBL), Rebecca said, “In the PBL system, there is always, like, room to improve and to keep, like, trying again.” Teddy pointed out that, “If you fail a test, you

have chances to redo it. So instead of getting mad at your mistakes you can be proactive and redo and get a better grade." Donna Jo implied that a growth mindset is important to the revision process: "You must be able to have a growth mindset and learn from your mistakes, take your failures and turn them into a success, in order to properly revise." The interviews revealed that all nine student-participants were able to connect at least one of the characteristics of growth mindset—such as the importance of overcoming failures and mistakes and the value of effort and perseverance—to an aspect of proficiency-based learning, like revising incorrect work, persevering past failure, or putting in effort, even when grades were not attached to the work being completed.

Perceptions of levels of engagement. Yeager et al. (2016) conducted a study that included over 11,000 ninth-grade students in various locations across the United States and Canada, with one of the purposes of the study being to elicit student feedback regarding revisions to an existing growth mindset intervention. Students reported that a growth mindset intervention should include quotes from admired adults and celebrities, should include diverse writing exercises, and should be clear about why someone should grow one's brain. They also said they wanted less reading and more bullet point summaries, they wanted actual data from scientific research, and they wanted examples that were relevant to teenagers (Yeager et al., 2016).

Researchers at Thomas B. Fordham Institute surveyed 2,000 students nationally in an attempt to find out what engages students in school (Geraci et al., 2017). Students reported that they felt more engaged when lessons used

technology and when they were able to work with their peers. Students also indicated that they were more engaged when they had choices. When creating the Growth Mindset Unit, I used the results of the research by Yeager et al. (2016) and Greaci et al. (2017) to try to create a unit that was engaging for students. Based on the student-participants' responses, I was careful to incorporate the following critical attributes into the unit: adults that the students admired, diverse writing exercises, actual scientific research, examples relevant to teenagers, and technology.

Attitudes about including admired adults. The student-participants reacted positively to the videos of admired adults. Michelle, Donna Jo, and Danny favorably viewed the video in which John Legend spoke about his journey to become a great singer. They thought he embodied what it means to have a growth mindset. Students also liked the other videos that featured celebrities. Jesse enjoyed the video featuring Michael Jordan's journey to greatness. Rebecca enjoyed all three. She felt they all had something to offer and couldn't identify the one that had the most impact. Danny and Rebecca liked the celebrity videos so much, they suggested starting the unit with those videos as a way to hook students into it.

Attitudes about including diverse writing exercises. To help the student-participants process the information presented in several of the lessons, I used diverse writing exercises, including worksheets and writing prompts. The majority of the student-participants preferred the writing prompts to the worksheets. Four of the student-participants explicitly indicated that the

worksheets were not engaging. Stephanie mentioned her disdain for the worksheets three times, “I just really don’t like worksheets.” Rebecca thought that the worksheets actually hindered her ability to absorb the information presented in the videos, and Teddy indicated that he, too, thought the worksheets were more of a hindrance than a help, stating, “I don’t think kids liked doing paperwork.”

Teddy and Donna Jo indicated that they did not like the worksheets, but found the writing prompts that checked for understanding were helpful. Both Jesse and Stephanie thought the worksheets were fine, but preferred the writing prompts. Rebecca thought the writing prompts were more tolerable than the worksheets, but still thought they were busy work. Kimmie thought the writing prompts were “uninteresting.” Contrary to the suggestions of the students in the Yeager et al. (2016) study, the student-participants in this study preferred to have fewer writing exercises and for the writing exercises to be similar in nature.

Attitudes about including actual scientific research. The students in the Yeager et al. (2016) study indicated that they wanted the growth mindset intervention to include more scientific research. For my study, I included a detailed scientific study conducted by Skeels (1966). This activity required the student-participants to read a summary of the study that Skeels originally conducted in 1939 and followed up on in 1966. With partners, I asked students to find the most important pieces of the study, and we discussed the implications as a whole group. Five of the student-participants specifically referenced this activity as one that they found particularly interesting. Kimmy thought that the

article was interesting and both Teddy and Danny liked that the science provided evidence for the educational theory of growth mindset. Joey liked that it showed how the theory applies to real people. Stephanie, who thought the majority of the Growth Mindset Unit was boring, thought the analysis of the Skeels (1966) was the most interesting activity from the Growth Mindset Unit.

Attitudes about providing examples relevant to teenagers. In an attempt to provide examples relevant to teenagers, I chose to show the students a TED Talk by Dr. Tae in which Dr. Tae uses skateboarding to talk about perseverance (TEDx Talks, 2011). Two students, Rebecca and Joey, spoke positively specifically about this video. Rebecca though that the video was relatable and it inspired her to take up projects that she had lost focus on, particularly her artwork. Joey thought that Dr. Tae's message made sense and helped him to connect perseverance to proficiency-based learning. Students expressed, however, that they wanted more real-life examples such as the talk by Dr. Tae.

Attitudes about using technology. The study conducted by researchers at the Thomas B. Fordham (Geraci et al., 2017) reported that students found learning that incorporated technology to be engaging. I attempted to incorporate technology with videos, activities involving the student-participants' school-issued laptops, and an activity using the Promethean Board (an interactive white board in my classroom). The interviews of the student-participants provided mixed reviews of this technology.

In total, I presented 13 different videos to the student-participants over the course of the Growth Mindset Unit. They ranged in length from 31 seconds to 15 minutes. The student-participants had mixed reviews of the videos presented, but there were some clear patterns in their comments.

The negative comments about the videos focused on the number of videos and the repetitiveness of the videos. Danny thought there were just too many videos and he felt that the content was too repetitive. Michelle agreed that there was repetitiveness and identified two groups of three videos each that were too much alike. She identified a group of three videos about the experiences of celebrities (Michael Jordan, John Legend, and JK Rowling) and a group of three videos specifically about growth mindset as being too similar to each other.

Two students, Joey and Jesse, specifically identified the Khan Academy video in which Sal Khan interviews Carol Dweck (Khan Academy, 2014) as a video that was not engaging and said that I should remove it from the Growth Mindset Unit. Jesse said that it contained similar information to other more engaging videos so it was unnecessary. Joey said, “I wasn’t a big fan of that Carol Dweck woman. She was a little bit weird.” Michelle preferred the animated video about growth and fixed mindset over the Khan Academy video about the same topic.

The student-participants reacted positively to the videos of admired adults. Michelle, Donna Jo, and Danny favorably viewed the video in which John Legend spoke about his journey to become a great singer favorably. They thought he embodied what it meant to have a growth mindset. They also enjoyed the other

videos that featured celebrities. Jesse liked the video featuring Michael Jordan's journey to greatness and Rebecca enjoyed all three. She felt they all had something to offer and couldn't identify the one that had the most impact. Danny and Rebecca liked the celebrity videos so much, they suggested starting the unit with them as a way to hook students into the unit. Rebecca and Joey also found the TED Talk by Dr. Tae to be particularly valuable. They felt it had real life application and said that was appealing. Jesse and Danny liked the Khan Academy video "You Can Learn Anything"; they thought it would be a good video to start the unit with and could inspire students to learn more about growth mindset.

The student-participants used their school-issued laptops for two activities, the brain scavenger hunt and the game called Kahoot! They did not like the brain scavenger hunt. Although they used their laptops to complete the activity, they did not find it engaging and said that the website they used was not particularly interesting. They did, however, like Kahoot! Stephanie thought that incorporating more games like this would be beneficial. Of creating activities that were engaging, Teddy said, "competition always helps." Several students suggested that turning the brain scavenger hunt into a competition might make it more engaging.

Kimmy and Michelle also really enjoyed the neuron activity, which used the Promethean Board. For this activity, the students could come up to the board to activate neurons in a simulation. The enjoyment, however, seemed to come less from the use of the technology, however, and more from the hands-on

nature of the activity. The student-participants indicated that they would like to have more hands-on activities. Kimmy said that, “For me to learn something, I kind of need to be one-on-one with someone or hands on.” She indicated that she enjoyed the activity in which we activated neurons by touching them on the Promethean Board. Several student-participants thought that making models of neurons would be an interesting hands-on project, especially if they could make them out of candy and eat them at the conclusion. The qualitative data supports the qualitative data analysis. Dweck’s (2066) growth mindset rating scale placed a heavy emphasis on the growth of intelligence. In the present study, the lessons the student-participants indicated that they enjoyed most were those that endorsed this concept. The student-participants’ description of an increased level of engagement in the activities that supported the idea that intelligence can be increased may have been a factor in the changes that occurred on the post-test survey.

Focus Group

I revised the unit using the feedback the student-participants provided during the individual interviews. My goal was to develop lessons that were (a) more engaging for students and (b) would foster a stronger connection between growth mindset and proficiency-based learning. Once the revisions to the unit were complete, I created a student-friendly outline of the unit that used images of the activities so the student-participants would recognize them and be able to see the sequencing and content in a mode that was accessible to them. I scheduled a focus group with the student-participants to give them an opportunity

to look over the revisions. The purpose was to reflect on the changes with the student-participants and determine the need for further revisions.

The student-participants did not offer as much feedback during the focus group as they did during the interviews. When I listened to the discussion in order to transcribe it, the students were significantly silent; my voice was the most prevalent. However, when the student-participants did speak, they spoke positively about the changes; they also had feedback and suggestions about additional revisions.

Student-participant approved changes. In their individual interviews, students shared that (a) they thought the celebrities' stories of struggle would be a "good hook" and should be moved to the beginning of the unit, (b) there were too many videos, (c) they didn't like the worksheets, and (d) there needed to be more of a connection to real life. The student-participants had an overall positive response to the changes. They reiterated that putting the videos at the beginning would be a better hook and they agreed that the writing prompts to check for understanding looked manageable. Teddy thought that students would get bored of the repetitive nature of the un-revised Growth Mindset Unit. He expressed that he thought the changes would solve that and that students would not get bored with the revised unit.

Additional revisions needed. After the initial revisions, the students thought that the order of the unit still needed some changes, that there still needed to be more hands-on activities, and that there still needed to be more real-life application. Several student-participants expressed that the concept of

growth mindset should go first so that students could connect all of the lessons to that concept. Joey said that he felt the connection to proficiency-based learning should go towards the end so that students had a better understanding of the purpose of the Growth Mindset Unit when it was over. The other students agreed. When probed to get ideas for more hands-on experiences and more real-life connection, the students said they thought that incorporating skits about what growth a mindset looks like and what a fixed mindset looks like in real life scenarios would hit both areas of need. Rebecca, a person who is often shy in group situations, agreed that skits would be a valuable addition.

Answering the Research Question

The purpose of the present actions research study was to describe nine tenth-grade student participants' perceptions of a teacher-researcher created Growth Mindset Unit. The student-participants perceived that the potential development towards a growth mindset as a result of the unit could help the student population at Truman be more successful in our proficiency-based system. They thought that the unit was relatively interesting, but that it needed some revision in order to be engaging to the larger student population.

All of the student-participants thought that fostering a growth mindset could help students succeed in a proficiency-based system. Rebecca moved into the district at the beginning of ninth grade and did not have any introduction to proficiency-based learning upon entering Truman. She indicated that the unit would have really helped her when she entered the system. She noted that the Growth Mindset Unit "could have helped me to realize that I can do more." Her

rationale was that, “In the PBL [proficiency-based learning] system, like, there [was] always, like, room to improve and you can just, like, try again.” Perseverance and effort are core tenants of growth mindset. Although Jesse already had a strong growth mindset, he saw the value that the Growth Mindset Unit would have for his classmates. “If they really want to be something in the future, like, that will like help them, like, know that growth mindset isn’t just something that you’re, like, just thinking about, it something that can actually help you.” Donna Jo agreed that growth mindset had specific application in a proficiency-based system.

Seven of the nine student-participants perceived that the unit as it existed was relatively interesting. Michelle and Teddy both pointed out that learning about neuroplasticity had been particularly interesting. Michelle had not learned about neuroplasticity before and she indicated that it really affected her view about a person’s ability to grow their brains. This correlated to her pre- and post-test survey, where she showed the most movement in the class from a fixed mindset to a growth mindset. Teddy also enjoyed learning about neuroplasticity. He specifically mentioned that he found it interesting that people can grow their brains through experiences and learning new things. Danny hadn’t really learned about growth mindset, but really liked the unit. Jesse’s response was, “I actually really like that stuff.” Two students, Kimmie and Stephanie, thought that the unit was a little boring.

All nine student-participants thought that the unit needed revisions in order to be engaging to the larger student population at Truman. The revision

suggestions included reducing the number of videos to eliminate repetition, taking out the worksheets and focusing just on the writing prompts to check for understanding, incorporating more hands-on activities, and making a stronger connection between growth mindset and real life.

Conclusion

The purpose of this study was to describe nine tenth-grade student-participants' perceptions of the teacher-researcher created Growth Mindset Unit. The focus of those perceptions was on the relationship between growth mindset and proficiency-based learning and the level of engagement that students felt with the lessons.

The data collected during the unit was both quantitative and qualitative in nature. The quantitative data gathered from individual interviews showed that the class as a whole moved from a mixed mindset to a growth mindset as a result of their participation in the Growth Mindset Unit. I coded the qualitative data to show the connections that students made between the concept of growth mindset and the tenants of proficiency-based learning, and to show the aspects of the unit that student-participants found engaging or not. I gathered additional qualitative data from a focus group discussion, which resulted in further revisions to the Growth Mindset Unit.

The findings from this study suggest that all students at Truman could potentially benefit from the implementation of the Growth Mindset Unit, once I've made additional revisions. Not all teachers at Truman have knowledge about growth mindset, which indicates a need for an action plan in which teachers are

involved in growth mindset education so they can effectively implement the unit in their own advisory classes.

Table 4.1

Pre-test Survey: Summary of Student-Participants' Mindset Scores and Grit Ratings

Student #	Student Name	Mindset Score	Grit Rating
1	Kimmy	10	11
2	Michelle	-9	17
3	Teddy	16	11
4	Rebecca	9	12
5	Joey	2	19
6	Donna Jo	9	13
7	Jesse	17	20
8	Stephanie	10	9
9	Danny	4	10
	Class Averages	7.556	13.556

Table 4.2

Student Demographics

Student #	Student Name	Self-identified Race	Self-identified gender	Military/ Shipyard Affiliation	Free/ Reduced Lunch
1	Kimmy	White	Female	No	No
2	Michelle	White	Female	No	No
3	Teddy	White	Male	No	No
4	Rebecca	White	Female	Yes	No
5	Joey	White	Male	No	Yes
6	Donna Jo	White	Female	Yes	No
7	Jesse	Hispanic/ Latino	Male	No	Yes
8	Stephanie	White	Female	No	Yes
9	Danny	White	Male	Yes	No

Table 4.3

Pre-test Survey: Growth Mindset Scores

Student #	Student Name	Mindset Score
1	Kimmy	10
2	Michelle	-9
3	Teddy	16
4	Rebecca	9
5	Joey	2
6	Donna Jo	9
7	Jesse	17
8	Stephanie	10
9	Danny	4
	Class Average	7.556

Note. Mindset scores ranged from -18 to +18 with scores interpreted as (a) 18 to -7 = fixed mindset; (b) 6 to +6 = mixed mindset; (c) +7 to +18 = growth mindset.

Table 4.4

Pre-test Survey: Summary of Student-Participants' Growth Mindset Responses

Q #	Strongly Agree	Agree	Somewhat Agree	Somewhat disagree	Disagree	Strongly disagree
1	0%	11%	11%	33%	33%	11%
2	22%	33%	22%	11%	11%	0%
3	0%	22%	11%	11%	56%	0%
4	11%	33%	44%	11%	0%	0%
5	33%	22%	33%	11%	0%	0%
6	0%	0%	11%	44%	22%	22%

Table 4.5

Pre-test Survey: Summary of Student-Participants' Grit Scale Ratings

Q #	Very Much Like Me	Mostly Like Me	Somewhat Like Me	Not Much Like Me	Not Like Me At All
1	11%	56%	33%	0%	0%
2	56%	22%	11%	11%	0%
3	22%	44%	33%	0%	0%
4	44%	11%	22%	22%	0%
5	11%	33%	44%	11%	0%
6	33%	44%	22%	0%	0%

Table 4.6

Pre-test Survey: Summary of Student-Participants' Responses

Student #	Student Name	Self-identified Race	Self-identified gender	Military/Shipyard Affiliation	Free/Reduced Lunch	Mindset Score	Grit Rating
1	Kimmy	White	Female	No	No	10	11
2	Michelle	White	Female	No	No	-9	17
3	Teddy	White	Male	No	No	16	11
4	Rebecca	White	Female	Yes	No	9	12
5	Joey	White	Male	No	Yes	2	19
6	Donna Jo	White	Female	Yes	No	9	13
7	Jesse	Hispanic/ Latino	Male	No	Yes	17	20
8	Stephanie	White	Female	No	Yes	10	9
9	Danny	White	Male	Yes	No	4	10
				Class Average		7.556	13.556

Note. 1. Mindset scores ranged from -18 to +18 with scores interpreted as (a)18 to -7 = fixed mindset; (b) 6 to +6 = mixed mindset; (c) +7 to +18 = growth mindset. 2. Grit Rating scale based on Duckworth (2016). Score is out of a total of 24, with higher scores corresponding to higher levels of grit.

Table 4.7

Post-test Survey: Summary of Class Responses

Q #	Strongly Agree	Agree	Somewhat Agree	Somewhat disagree	Disagree	Strongly disagree
1	0%	0%	11%	11%	44%	33%
2	11%	78%	11%	0%	0%	0%
3	0%	0%	0%	44%	33%	22%
4	0%	78%	22%	0%	0%	0%
5	33%	56%	11%	0%	0%	0%
6	0%	0%	0%	22%	56%	22%

Table 4.8

Student-Participants' Mindsets Pre- and Post-Intervention

Student Name	Pre-Intervention Mindset Score	Post Intervention Mindset Score
Kimmy	10	6
Michelle	-9	13
Teddy	16	14
Rebecca	9	14
Joey	2	11
Donna Jo	9	10
Jesse	17	16
Stephanie	10	11
Danny	4	12
Class Average	7.556	11.889

Note. Mindset scores ranged from -18 to +18 with scores interpreted as (a) -18 to -7 = fixed mindset; (b) 6 to +6 = mixed mindset; (c) +7 to +18 = growth mindset.

Chapter Five: Summary, Conclusions, and Action Plan

Introduction

The purpose of Chapter Five is to summarize the present study, describe the conclusions, and propose an action plan. I conducted the study at Truman Academy, a small public high school in coastal, southern Maine. During their advisory class, nine tenth-grade students participated in a four-week unit that I created based on Dweck's (2006) growth mindset theory, which argues that intelligence and ability can grow over time with effort, education, and practice. I taught the student-participants how their brains worked, explained that a growth mindset has been shown to increase student success, and showed them ways they could begin to develop a growth mindset.

Problem of Practice

Truman implemented a proficiency-based system of learning, which required students to master a specific competency before moving on to the next level. Truman implemented the system without preparing students for the corresponding shift in teaching and learning. I believed that helping students acquire growth mindset attributes through the implementation of a growth mindset curriculum might prepare them for success in the new system. As a teacher-researcher, I created a curriculum adequately grounded in Dweck's (2006) growth mindset theory, implemented it with student-participants, obtained their feedback and revised it for use with other students at Truman.

Research Question

My research question was: “What are the perceptions of tenth-grade student-participants regarding a teacher-researcher developed Growth Mindset Unit?”

Statement of Purpose

The primary purpose of this study was to determine the student-participant’s perceptions of the Growth Mindset Unit I developed. The goal was to gather feedback from the student-participants through interviews and a focus group discussion so that I could refine the unit and make it engaging and relevant to proficiency-based learning. The secondary goal was to describe any changes in the mindsets of the nine student-participants as a result of their participation in the four-week Growth Mindset Unit.

Methodology

In order to investigate my research question, I administered a pre- and post-test survey to understand the student-participants’ mindsets before and after the unit. I conducted interviews with each student-participant in order to understand their perceptions of the unit. I then revised the unit using what I learned from the individual interviews.

Findings

.All of the student-participants indicated that exposure to the Growth Mindset Unit could help students be more successful in our proficiency-based system, particularly because growth mindset emphasizes the value of making mistakes and the importance of effort and perseverance. However, all students

thought that the unit should be more engaging. Their suggested revisions included changing the order of the lessons, reducing the number of videos, eliminating the worksheets, incorporating more hands-on activities, and making stronger connections to real life.

Using this feedback, I revised the unit. In a focus group discussion, I shared the revised unit with the student-participants. The student-participants had positive reactions to the changes made to the order of the lessons, reduction in videos, and elimination of worksheets. The group indicated, however, that the unit still needed more hands-on activities and connections to real life.

Because the findings indicated that all nine student-participants could articulate the ways in which the Growth Mindset Unit would help students in our proficiency-based system, I created an action plan to implement the unit into all advisory classes.

Key Questions

Several key questions emerged from this study. The first question that emerged was: “How can I use the Growth Mindset Unit to improve our proficiency-based education system so that all students benefit?” This question was the foundation for the development of the action plan.

The second question was posed by the student-participants and was a concern of mine as well: “How can we ensure that all students get an equitable experience from the Growth Mindset Unit in their advisory classes?” Teddy initially posed this question because some teachers do not engage effectively with their advisory students. Referring to the teachers, Danny indicated, “There

are always people who just want to do nothing in advisory." This reluctance of some teachers to engage effectively with their advisory students is a known issue at Truman and one that will need to be addressed.

The third question that emerged was based on the assumption that the Growth Mindset Unit will be implemented school-wide per my action plan: "Will there be a quantitative increase in the number of competencies that are met over the school year when compared to the total number of competencies met in years prior to the implementation of the Growth Mindset Unit?" The purpose of implementing the Growth Mindset Unit is to better prepare students to meet the competencies in our proficiency-based system. It would be important to track and record competency attainment before and after the growth mindset treatment in order to answer this question.

The final question was: "How does growth mindset impact students' identity and/or self-efficacy?" Dweck (2006) indicated that students often see failing at a task as an indication that they are failures. It is worth exploring whether fostering a growth mindset has an impact on students' identities or if it improves students' self-efficacy so that they see the failure as an action that they can improve, not a reflection of who they are.

Action Researcher Positionality

I conducted this study at Truman Academy, where I had taught for the last eight years of my nineteen-year teaching career. During that time, I served on the committee charged with facilitating the proficiency-based system, the steering committee for our teacher evaluation system, and a statewide teacher leader

committee. I had also been my department's team leader and was currently serving as the lead new teacher mentor. These positions allowed me to gain the respect of my colleagues and to establish myself as a leader. I believe that the administration and some of the faculty recognize me as a leader and that this standing will help me implement my action plan. .

Mertler (2017) defined a teacher-researcher as a full participant, "simultaneously a fully functioning member of the 'community' as well as a researcher" (p. 96). I was a teacher of the advisory class. The student-participants were members of my advisory class for their four years at Truman. They therefore viewed me as an insider of our advisory class community. As Mertler (2017) argued, in the role of the insider, "the researcher is first and foremost part of the group—as opposed to being an 'outsider'—who also happens to be collecting data on the group" (p.96). The student-participants and I had already worked together for more than a year at the time of the study. Although they knew they would be collaborating with me on the study, the actual implementation of the Growth Mindset Unit fit well into the structure of the advisory class and allowed me to keep the status of a full participant. As an outsider, I collected the data using pre- and post-test surveys, semi-structured interviews, and a focus group, and I reported my findings.

Being an insider created some challenges. First, I had pre-conceived expectations regarding the level of engagement the student-participants would exhibit towards the Growth Mindset Unit, such as the brain scavenger hunt. When the student-participants did not fully engage in an activity, I took their lack

of engagement personally when I should have reflected on the activity more objectively. Second, because I knew the student-participants well, I missed opportunities to ask some potentially important questions both in the demographic section of the pre-test survey and in the interviews. For example, asking more questions about the student-participants' family backgrounds and the students' own prior educational experiences would have allowed me to provide more well-rounded descriptions of the students.

The Action Plan

According to Mertler (2017), the ultimate goal of any action research study is to develop an action plan, and the point of the action plan is to devise "a specific and tangible approach to trying out some new ideas as a means to solve the original problem" (p. 43). In my study, the original problem was that the district did not provide the students at Truman with sufficient support to be successful in the new proficiency-based education system. Specifically, the students were not well prepared for the changes in attitudes about mistakes and failure or for changes in expectations about effort and perseverance. The "specific and tangible approach" (Mertler, 2017) to solve that problem was to implement a growth mindset curriculum. A growth mindset can help students have a more positive outlook on mistakes and failure, and help them understand the value of effort and perseverance.

Developing an Action Plan

All nine student-participants involved in the present study believed that learning about growth mindset could help students at Truman be more

successful in our proficiency-based education system. They indicated that having a growth mindset could affect students' perceptions about making mistakes and experiencing failure. For example, Kimmy thought a growth mindset would encourage students to "keep trying even if they fail." Referring to making mistakes, Danny indicated that growth mindset "kind of just teaches you that it's just part of how you learn." Donna Jo implied that a growth mindset was important because "you must be able to have a growth mindset and learn from your mistakes, take your failures, and turn them into a success."

In order to help students at Truman develop a growth mindset, I created a Growth Mindset Unit that I could implement in the students' daily advisory classes. I piloted the unit with the nine tenth-grade students enrolled in my advisory class. The student-participants evaluated the unit and shared their feedback during one-on-one semi-structured interviews. We then collaborated during a focus group session to further revise the unit so it was more engaging and could be used to teach all Truman students about growth mindset.

The Action Plan

The student-participants thought the Growth Mindset Unit could be beneficial for other students at Truman. The question became: "How can I use the Growth Mindset Unit to improve our proficiency-based education system so that all students benefit?" The answer was to provide the Growth Mindset Unit to other advisory teachers to implement in their advisory classes.

In a study by Paunesku, et al. (2015) of 1,500 students across thirteen high schools, researchers found they could effectively deliver a growth mindset

curriculum using standardized materials that employed common narratives and objective information, and was not customized to the students' school context. However, I didn't think it would be effective to just give a copy of the unit to the teachers and expect them to teach it. Teachers would need professional development about growth mindset. Instruction on how to implement the Growth Mindset Unit could help teachers feel more comfortable with curriculum and might provide valuable feedback. As a leader in my school, I am going to take on the responsibility of educating my peers about the theory of growth mindset and the Growth Mindset Unit during one or more professional development days. I will gather their feedback and make any necessary revisions to the unit.

Action Responsibility

I would need to inform the school administration about my action plan and secure approval. I have already had several conversations with the principal of Truman, who told me that he would like to see the Growth Mindset Unit become a regular part of the advisory curriculum for all ninth-grade students. I need to work directly with him to determine which professional workshops will be devoted to growth mindset and to establish the timeline for implementation.

The principal and I would work collaboratively to monitor the action plan. During the focus group discussion, some student-participants expressed concern that not all students would have an equitable experience from the Growth Mindset Unit because they had heard their peers say that not all advisors engage with their students. The purpose of using workshop time would be to work collaboratively with teachers on the Growth Mindset Unit so they feel more

comfortable implementing it. If teachers still did not provide an equitable experience for their students, then the principal would need to monitor those teachers.

Data Collection

I would collect data on the number of competencies that students met before and after growth mindset instruction. The purpose would be to see if the Growth Mindset Unit has any impact of the success of the students in our proficiency-based learning system. Additionally, I would collect data to determine whether being exposed to a growth mindset curriculum has an impact on students' identity or self-efficacy. The data collection would involve collaboration with administration because I would need permission in order to collect student data about competency attainment and to survey students about identity and self-efficacy.

Timeline

I will implement the action plan during the 2019–2020 school year. The principal has expressed that he would like to see the Growth Mindset Unit implemented towards the beginning of the school year so that the students can reap the maximum benefit. I will work closely with the principal to determine which professional workshop days should be set aside for this task.

June 2019:

I will collect data about student competency attainment during the 2018–2019 school year. I will compare this data to student attainment data at the end

of the 2019–2020 school year to describe the impact, if any, that the growth mindset curriculum had on student competency attainment.

August–September, 2019:

Teachers will participate in two professional development workshop opportunities. I will use one workshop to present the theory of growth mindset. In the second workshop, I will present and discuss the Growth Mindset Unit. I will gather feedback from teachers regarding revisions and work collaboratively with them to troubleshoot any potential issues.

September–October 2019:

I will survey the students at Truman to gather data about their mindsets and self-efficacy prior to the growth mindset intervention.

October–November 2019:

The teachers will implement the growth mindset intervention in their advisory classes over the course of four weeks. Students will be surveyed after the implementation to record any changes in their mindsets.

June 2020:

I will collect data about student competency attainment during the 2019–2020 school year. I will compare this to data for 2018–2019 to determine the impact, if any, that the growth mindset curriculum had on student competency attainment. I will also survey the students to see if there were any changes in mindset since the end of the unit and to measure changes in self-efficacy since the beginning of the school year.

Resources

The implementation of the Growth Mindset Unit would not require any additional resources. The students did not particularly care for the video and worksheet from Mindset Works (2017) which was the only the only resource that required a subscription, and that lesson was eliminated. The remaining curriculum used only free, publically accessible resources such as TED and Khan Academy and would not require any funding from the district. Each teacher already has a laptop, as well as a projector, Smartboard, or a Promethean Board. The students also have school-issued laptops.

Facilitating Education Change

Fitzgerald and Laurian-Fitzgerald (2016) argued that students cannot learn a growth mindset in isolation or by listening to a lecture; instead, teachers must create an environment in the school that will support students in the efforts to grow their growth mindsets. Dweck (2010) agreed that, although teaching students about mindsets directly is important, it is equally as important to create a growth mindset culture that includes not only students, but also teachers: "When teachers believe that everybody's ability can grow, and they give all students opportunities to achieve at high levels, students achieve at high levels" (Boaler, 2013, p. 150). Teachers need to be aware that ability is malleable because they are the ones who communicate messages to students about their ability and learning (Boaler, 2013). Developing a culture of growth mindset would mean that teachers and students share an understanding and a common language that promotes growth mindset.

The major challenge when implementing an educational change is to get buy-in from both teachers and students. Although there is a lack of research regarding the percentages of teachers that hold each type of mindset, I have anecdotal evidence that some teachers at Truman have a fixed mindset. I have heard some say, “That student is not honors material” or that a particular student is not capable of meeting the competency no matter what the teacher does. Professional development time that is devoted to developing an understanding of growth mindset among the faculty will be a key factor to overcoming these challenges. Once teachers are aware that there is evidence that a growth mindset is important and can help students be more successful, they will be more likely to buy in. Teachers must see this as an enduring understanding, not just a passing fad.

I hope to use this study and action plan to positively enhance the educational atmosphere at Truman for all stakeholders—students, teachers, and administrators. The educational change that I am proposing has the potential to empower students while minimally affecting teachers. Learning about growth mindset, working on changing attitudes, and using common language that fosters growth mindset has the power to ignite educational change.

Summary of Findings

The purpose of the present study was to describe how nine tenth-grade students perceived the growth mindset curriculum I created. Growth mindset theory (Dweck, 2006) emphasizes the value of making mistakes and failing, and the importance of effort and perseverance. Developing a growth mindset can

help students succeed in the proficiency-based system that the district has implemented at our school. This study looked at the student-participants' level of growth mindset before and after the Growth Mindset Unit and examined their perceptions of the unit.

Research Finding One

Learning about growth mindset increased the growth mindsets of six of the nine student-participants. The class as a whole had a growth mindset increase of 36.45% after participating in the unit. Three students experienced a decrease in growth mindset. Two of the students had high scores initially and had a slight drop so they remained in the growth mindset range. One student experienced a more significant drop from a growth mindset to a mixed mindset. My study suggests that exposing all students at Truman to the growth mindset curriculum could increase their growth mindsets.

Research Finding Two

The student-participants were able to see the connection between growth mindset theory and the elements needed to be successful in a proficiency-based education system. All nine student-participants were able to connect at least one of the characteristics of growth mindset—whether it was failure, making mistakes, effort, or perseverance—to an aspect of proficiency-based learning, like revising incorrect work, persevering past failure, or putting in effort even when grades were not attached to the work being done. Because of this connection, the student-participants indicated that developing a growth mindset could help other students be more prepared and successful in a proficiency-

based system and that implementing the Growth Mindset Unit school-wide would be beneficial.

Research Finding Three

Student-participants thought that the Growth Mindset Unit was valuable, but they felt several changes were needed in order to engage other students. Some of the recommended changes included rethinking the order in which the information was presented, eliminating worksheets, having more hands-on activities, and making more explicit connections to proficiency-based learning and real life.

Suggestions for Future Research

The purpose of this study was to describe the perceptions of nine tenth-grade student-participants regarding a growth mindset curriculum and its application to a proficiency-based education system. I did not attempt to measure any improvement in performance as a result of participating in the Growth Mindset Unit. The next step in the research process would be to implement the Growth Mindset Unit on a larger scale, perhaps to an entire grade, and compare competency attainment before and after the unit. It would also be beneficial to survey the larger student population about their perceptions of the unit and to use that feedback to make additional revisions.

Dweck (2006) indicated that students often take on the identity of a failure when they experience failure on a particular task. One of the key questions that arose during the present action research was: “How does growth mindset impact students’ identity and/or self-efficacy?” It would be important to survey students

to see if the Growth Mindset Unit has an impact on students' identity, particularly as it relates to failure. Additionally, research could be done to see if students are more likely to believe they can be successful and attain goals after they learn about growth mindset.

Conclusion

The purpose of this study was to describe how a small group of student-participants perceived a growth mindset curriculum. In a growth mindset, people believe that they have the ability to grow their intelligence. This takes effort, perseverance, and an understanding that mistakes and failure contribute to brain growth. Truman has a proficiency-based educational system that requires students to put forth effort, persevere through challenges, learn from their mistakes, and continue to learn even when they have failed, in order to pass all of the required competencies.

I collected pre- and post-test surveys, transcriptions of semi-structured individual interviews, and a focus-group discussion. The pre- and post-test surveys indicated that the group as a whole moved towards a growth mindset. The interviews showed that students could make a connection between growth mindset ideology and proficiency-based pedagogy. The student-participants reported that having a growth mindset could help students be more successful in our proficiency-based education system. Through collaboration with the student-participants, I revised the Growth Mindset Unit. Based on my findings, I created an action plan to make the Growth Mindset Unit available to all students. I have planned a new study which will enable me to understand whether the

implementation of the growth mindset unit increases competency attainment or student self-efficacy. The desired outcome is that more students at Truman will be successful in our proficiency-based education system.

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Appendix A: Google Form Student Pre-Test Survey

Research Study Student Survey

This survey is to find out more information about you. Please answer as honestly as you can. Your responses will never be associated with your name. Click 'Next" when you are ready to continue.

Your email address (jdufort@traipacademy.org) will be recorded when you submit this form. Not jdufort? Sign out
* Required

Demographics

This section will allow me to report out about the characteristics of the group of students that I am working with.

1. **What is your birthdate?** *

   Example: December 15, 2012

2. **What race do you identify with?** *

   Mark only one oval.

   - African American
   - Hispanic or Latino
   - Asian
   - White
   - Native American
   - Mixed Race
   - Other
   - Not Sure
   - Prefer not to say

3. **What gender do you identify with?** *

   Mark only one oval.

   - Male
   - Female
   - Transgender
   - Gender Non-Conforming
   - Gender-fluid
   - Gender-neutral
   - Other
   - Would prefer not to say

4. **How many people are in your household?** *

5. **Is anyone in your household a part of the military?** *
Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Not Sure

6. **Does anyone in your household work at the Shipyard but is not part of the military?** *
Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Not Sure

7. **Do you currently, or have you ever received free or reduced lunch?** *
Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ I can't remember
- ◯ Not sure
- ◯ Would prefer not to say

Mindset

This section will allow me to gather data about your thoughts on learning. Answer as honestly as possible and remember that there are no wrong answers.

8. **A person is born with a certain amount of intelligence (IQ) and that doesn't change.** *
Mark only one oval.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Somewhat Agree
- ◯ Somewhat Disagree
- ◯ Disagree
- ◯ Strongly Disagree

9. **A person can increase his/her intelligence (IQ) significantly during his/her lifetime.** *
Mark only one oval.

- Strongly Agree
- Agree
- Somewhat Agree
- Somewhat Disagree
- Disagree
- Strongly Disagree

10. **Although a person can learn new things, his/her intelligence (IQ) doesn't really change.** *
Mark only one oval.

- Strongly Agree
- Agree
- Somewhat Agree
- Somewhat Disagree
- Somewhat Disagree
- Disagree
- Strongly Disagree

11. **Learning new things can change a person's intelligence (IQ) significantly.** *
Mark only one oval.

- Strongly Agree
- Agree
- Somewhat Agree
- Somewhat Disagree
- Disagree
- Strongly Disagree

12. **No matter how high a person's intelligence is (IQ), that person can always become more intelligent.** *
Mark only one oval.

- Strongly Agree
- Agree
- Somewhat Agree
- Somewhat Disagree
- Disagree
- Strongly Disagree

13. **Some people have intelligence (IQ) that is so low, they cannot increase it.** *

Mark only one oval.

- Strongly Agree
- Agree
- Somewhat Agree
- Somewhat Disagree
- Disagree
- Strongly Disagree

Mindset, Part 2

For this section, think about your own personal experiences and decide how closely these statement relate to you. Please answer honestly. There are no right or wrong answers.

14. **Setbacks don't discourage me. I don't give up easily.**

Mark only one oval.

- Very much like me
- Mostly like me
- Somewhat like me
- Not much like me
- Not like me at all

15. **New ideas and projects sometimes distract me from previous ones.** *

Mark only one oval.

- Very much like me
- Mostly like me
- Somewhat like me
- Not much like me
- Not like me at all

16. **I am a hard worker.** *

Mark only one oval.

- Very much like me
- Mostly like me
- Somewhat like me
- Not much like me
- Not like me at all

17. **I have difficulty maintaining my focus on projects that take more than a few months to complete.** *

Mark only one oval.

- ◯ Very much like me
- ◯ Mostly like me
- ◯ Somewhat like me
- ◯ Not much like me
- ◯ Not like me at all

18. **I finish whatever I begin.** *

Mark only one oval.

- ◯ Very much like me
- ◯ Mostly like me
- ◯ Somewhat like me
- ◯ Not much like me
- ◯ Not like me at all

19. **I have overcome setbacks to conquer an important challenge.** *

Mark only one oval.

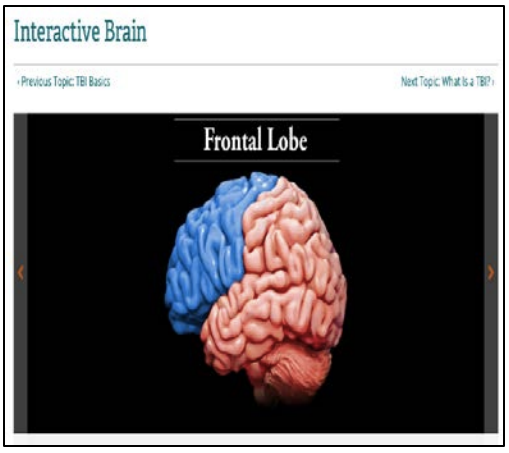
- ◯ Very much like me
- ◯ Mostly like me
- ◯ Somewhat like me
- ◯ Not much like me
- ◯ Not like me at all

Appendix B: Growth Mindset Unit Curriculum

Growth Mindset Unit

Part One: Introduction to the Brain, Neurons, and Neuroplasticity

Lesson 1: Introduction to the Brain



Timeframe: 1 Advisory Block

Objective: To learn basic brain anatomy

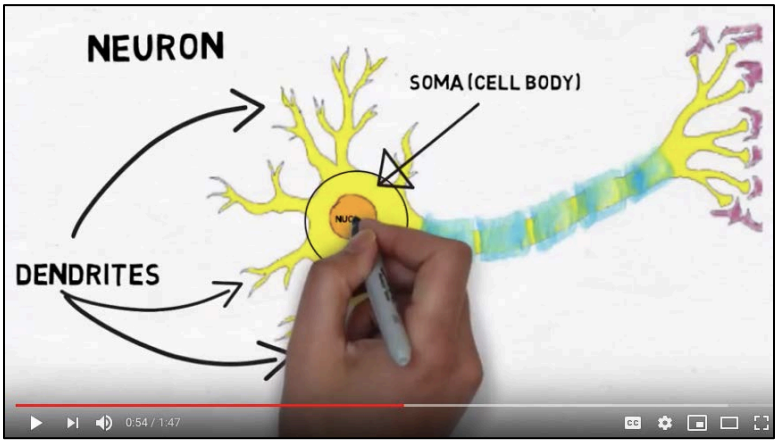
Rationale: The purpose of this lesson is to help the students learn some basic anatomy of the brain. Many students have little knowledge about the parts and functions of the brain. Because the brain is an important part of Growth Mindset, it is helpful students acquire basic knowledge about it prior to learning about Growth Mindset.

Activity: The students will participate individually in a "Brain Scavenger Hunt". The students will use their school issued laptops to access the Brainline Interactive Brain website to answer a series of questions about the brain that have been posted to our advisory class's Google Classroom. Once everyone has completed the scavenger hunt, we will go over the answers together.

Lesson 2: The Neuron

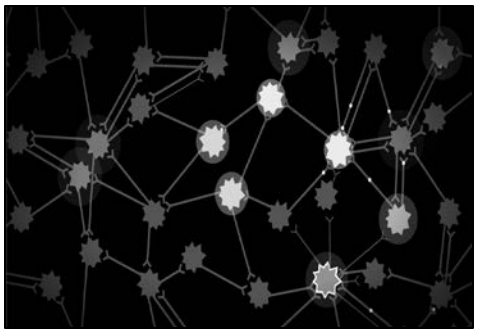
Timeframe: 1 Advisory Class

Objective: To learn how neurons work



Rationale: Growth Mindset is about how a person's brain can grow from learning new knowledge or developing new skills. In order to prepare students to learn about Growth Mindset, students will learn about how neurons work can illustrate how brain function can improve. This foundational knowledge can help the students to understand the concept of neuroplasticity, a concept introduced in the next lesson.

Activity: As a class, we will begin by watching two short videos. The first video, 2-Minute Neuroscience: The Neuron, gives a basic description of the anatomy of a neuron. The second video, 2-Minute Neuroscience: The Synaptic Transmission, explains how messages are transmitted from one neuron to the next. The students will then have the opportunity to use the Promethean Board to activate neurons to see how they work using the interactive website called Neurotic Neurons: An Interactive Explanation. The students will explain how neurons work in their own words using our Google Classroom.

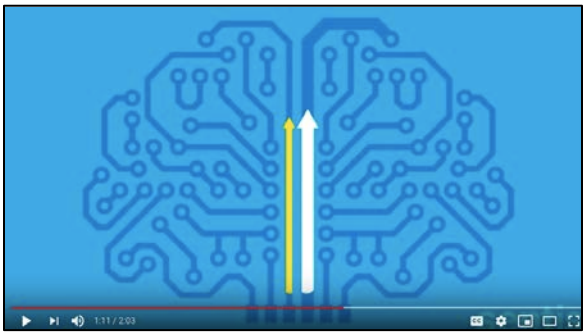


Lesson 3: Neuroplasticity

Timeframe: 1 Advisory Class

Objective: To learn about neuroplasticity

Rationale: Neuroplasticy is how a person's brain changes as something



is learned. This is an important building block in understanding the science behind Growth Mindset ideology because in order to believe the brain can grow with effort, a person must understand the science behind how it grows. Once growth mindset is introduced, the students will be able to understand the science behind it.

Activity: The students will watch two videos to help them learn about neuroplasticity, Neuroplasticity and Your Brain is Plastic. Parts of these videos reinforce the information learned in previous lessons. The students are then asked to pretend they are chatting with a friend and to explain neuroplasticity to that friend.

Lesson 4: Making Mistakes Makes Your Brain Grow Stronger

Timeframe: 2 Advisory Classes

Objective: To make the connection between neuroplasticity, making mistakes, and brain growth

Rationale: In the proficiency-based system, when students make mistakes, they have to correct them. Some students see the mistakes as failures, indications that they are not capable. Growth mindset reinforces that mistakes can be beneficial to learning and brain growth. This TED Talk sets the stage for learning about growth mindset in future lessons.

Activity: The students will watch a TED Talk by Jo Boaler called How You can Be Good at Math, and Other Surprising Facts About Learning. This video is significantly longer than the others that the students have watched thus far. After the video, we will have a class discussion that

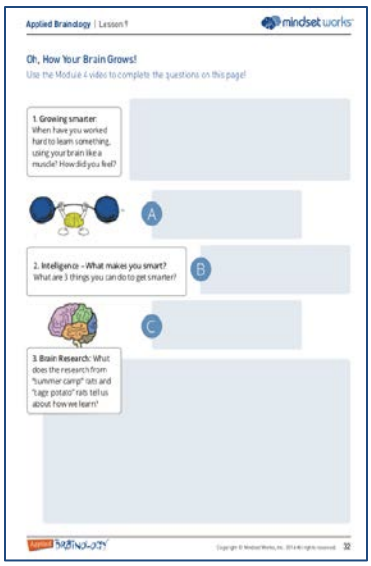
recaps the major points of the video, like that mistakes help your brain to grow stronger. The students will also be asked to brainstorm the implications of the claims made in the video as they relate to proficiency-based learning.

Lesson 5: Scientific Research, Part 1

Timeframe: 1 Advisory Class

Objective: To bring in a scientific study that supports the idea of neuroplasticity

Rationale: In a study conducted by Yeager et al. (2016), students indicated that they wanted more data from scientific research in a growth mindset curriculum. This video summarizes a study in which rats were provided with different educational environments. Additionally, in the study by Yeager et al. (2016), the students indicated that they wanted a variety of writing assignments so a worksheet is used in this lesson.


Applied Brainology | Lesson 1

mindsetworks

Oh, How Your Brain Grows!

Use the Module 4 video to complete the questions on this page!

1. Growing smarter: When have you worked hard to learn something, using your brain like a muscle? How did you feel?

A

2. Intelligence – What makes you smart? What are 3 things you can do to get smarter?

B

C

3. Brain Research: What does the research from "summer camp" rats and "lazy potato" rats tell us about how we learn?

Activity: The students will watch a video from Module 4 of the *Brainology* curriculum. The curriculum also provided a supplemental worksheet to help students to organize the information in the video. The students will be asked to complete the worksheet while watching the video.

Lesson 6: Scientific Research, Part 2

Timeframe: 3 Advisory Classes

Objective: To bring in a scientific study that supports the idea of neuroplasticity

Rationale: In a study conducted by Yeager et al. (2016), students indicated that they wanted more data from scientific research in a growth

mindset curriculum. In this lesson, the students will read about a scientific study that supports the concept of neuroplasticity.

Activity: The students will read a study conducted by Skeels and Dye (1966) in which orphans were exposed to different educational environments and the impact of that exposure. The article is lengthy and relatively academic, so the students will work in pairs to decipher its contents over the course of two advisory classes. We will discuss the implications of the article during the third advisory class.

Lesson 7: Checking for Understanding

Timeframe: 1 Advisory Class

Objective: To get a snapshot of how much the students understood and retained Part One: The Brain, Neurons, and Neuroplasticity

Rationale: This activity will give me a report that summarizes the knowledge the students have gained from this unit.

Activity: The students will participate in a game of Kahoot! One of the benefits of using the Kahoot! game platform is that I can then see a report of how each student performed on each question. Another benefit: The students love it!

Part Two: Understanding Growth Mindset

Lesson 8: Carol Dweck and Growth Mindset

Timeframe: 1 Advisory Class

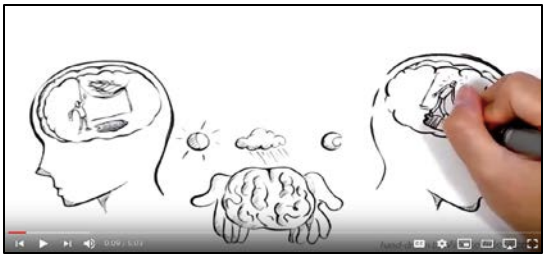
Objective: To be introduced to Carol Dweck and the concept of Growth Mindset

Rationale: This is the point in the lesson when the students will begin to learn about growth mindset. They will learn who Carol Dweck is and what growth mindset ideology is.

Activity: The students will watch two short videos published by Khan Academy called You Can Learn Anything, and The Growth Mindset to

introduce them to the concept of growth mindset. The students will have a worksheet that they will use for this lesson and the next lesson. The purpose of the worksheet is to organize the information they will be receiving about growth mindset and fixed mindset.

Lesson 9: Understanding Growth and Fixed Mindsets



Timeframe: 2 Advisory Classes

Objective: To learn the definitions of growth mindset and fixed mindset and to be able to differentiate between the two.

Rationale: The students need to learn the characteristics of each type of mindset so that they can assess their own mindsets.

Activity: Over the course of two advisory classes, the students will watch two videos about growth and fixed mindset. Each video has its strengths and weaknesses. The first video, Growth Mindset vs. Fixed Mindset, uses an illustrative technique that students typically find engaging. The second video, Growth Mindset Introduction: What It Is, How It Works, and Why It Matters, uses admired adults, which the Yeager et al. (2016) study indicated that students wanted. The students will continue to add to their worksheets as they progress through these two videos. The worksheet will focus on the ideas of effort, hard work, and

perseverance so students can start to make the connection between growth mindset and proficiency-based learning.

Lesson 9: Growth Mindset Attributes – Overcoming Obstacles

Timeframe: 1 Advisory Class

Objective: To provide students with real world examples of people who have used growth mindset thinking to overcome obstacles.

Rationale: According to the Yeager et al. (2016) study, students wanted lessons that incorporated admired adults. All three of these videos focus on an admired adult and how that person used growth mindset ideology in their real lives.

Activity: The students will be presented with three videos, one of Michael Jordan, one of John Legend, and one of J.K. Rowling. After viewing the videos, the students will work with partners to discuss how each person uses growth mindset thinking. The groups will then share out to the whole group.

Lesson 10: Connecting Growth Mindset Ideology to Proficiency-Based Learning

Timeframe: 2 Advisory Classes

Objective: To reinforce the growth mindset attributes of perseverance, and make explicit connections between growth mindset and proficiency-based learning.

Rationale: In the Yeager et al. (2016) study, students indicated that a growth mindset curriculum should have examples that are relevant to

teenagers. In this TED Talk, the speaker uses skateboarding as an example, which may be relevant to some teenagers.

Activity: The students will watch a TED Talk by Dr. Tae called Can Skateboarding Save Our Schools? After watching the video, the students will use the Google Classroom to write reflectively about a time in which they had to persevere over an extended period of time to get better at something. After writing, they can choose to share with the whole group. Students will then be asked to work with partners to discuss how Dr. Tae's TED Talk is related to proficiency-based learning. How was the process of learning a specific trick in skateboarding similar to the process of learning a skill, like a math skill, in proficiency-based learning?

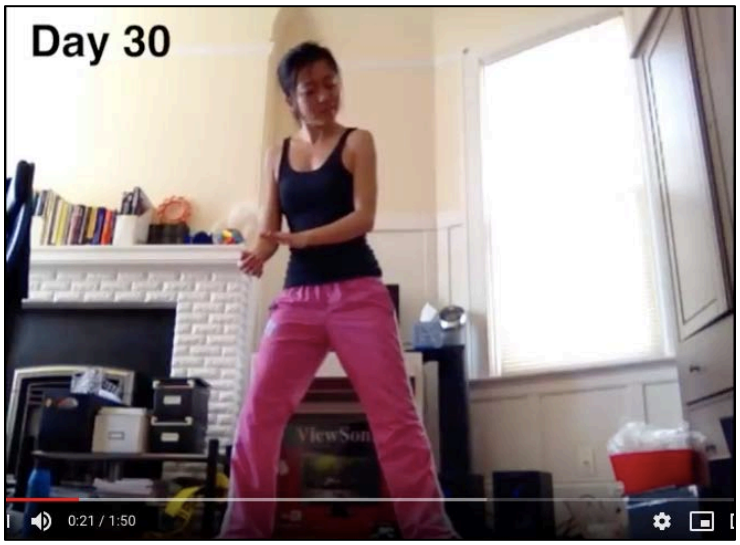
Part Three: Putting Growth Mindset and Grit into Action

Lesson 11: 100 Days

Timeframe: 2 Advisory Classes (and Beyond)

Objective: To help the students begin to foster a growth mindset and develop grit through the planning and completion of a student-driven long-term project.

Rationale: The Geraci et al. (2017) study, students indicated that they were more engaged when they had choice. The students will be able to choose a project that suits their goals and interests. The Yeager et al. (2016) study indicated that students want a curriculum that is relevant to



teenagers. Because they will get to choose their projects, they can choose something that is relevant to them.

Activity: The students will watch one or more videos from the 100 Days Project. The 100 Days Project was a national phenomenon in which people committed to learning something new for 100 days and tracked their progress using a video

diary. After watching the videos, the students will brainstorm something that they have always wanted to learn. We will work together to choose something that they can work on both inside and outside of school. The students will then make a 100 Days Project Plan.

Appendix C: Google Form Student Post-Test Survey

Research Study Student Exit Survey 2

This survey is to revisit your opinions. Please answer as honestly as you can. Your responses will never be associated with your name. Click "Next" when you are ready to continue.

Your email address (**jdufort@traipacademy.org**) will be recorded when you submit this form. Not **jdufort?** Sign out
* Required

Part 1

This section will allow me to gather data about your thoughts on learning. Answer as honestly as possible and remember that there are no wrong answers.

1. **A person is born with a certain amount of intelligence (IQ) and that doesn't change.** *
   Mark only one oval.
   - ◯ Strongly Agree
   - ◯ Agree
   - ◯ Somewhat Agree
   - ◯ Somewhat Disagree
   - ◯ Disagree
   - ◯ Strongly Disagree

2. **A person can increase his/her intelligence (IQ) significantly during his/her lifetime.** *
   Mark only one oval.
   - ◯ Strongly Agree
   - ◯ Agree
   - ◯ Somewhat Agree
   - ◯ Somewhat Disagree
   - ◯ Disagree
   - ◯ Strongly Disagree

3. **Although a person can learn new things, his/her intelligence (IQ) doesn't really change.** *
Mark only one oval.

- Strongly Agree
- Agree
- Somewhat Agree
- Somewhat Disagree
- Somewhat Disagree
- Disagree
- Strongly Disagree

4. **Learning new things can change a person's intelligence (IQ) significantly.** *
Mark only one oval.

- Strongly Agree
- Agree
- Somewhat Agree
- Somewhat Disagree
- Disagree
- Strongly Disagree

5. **No matter how high a person's intelligence is (IQ), that person can always become more intelligent.** *
Mark only one oval.

- Strongly Agree
- Agree
- Somewhat Agree
- Somewhat Disagree
- Disagree
- Strongly Disagree

6. **Some people have intelligence (IQ) that is so low, they cannot increase it.** *
Mark only one oval.

- Strongly Agree
- Agree
- Somewhat Agree
- Somewhat Disagree
- Disagree
- Strongly Disagree

Appendix D: Revised Growth Mindset Unit Curriculum

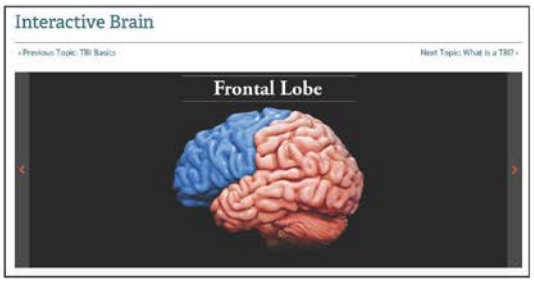
Revised GROWTH MINDSET UNIT

THE HOOK

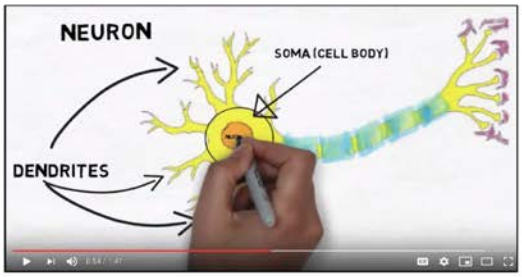
INTRODUCTION TO THE BRAIN

Part 1: The Brain AR/VR app - learn about parts of the brain using the app

Part 2: The Brain Scavenger Hunt Competition (Teams) w/ help of website. Prizes!

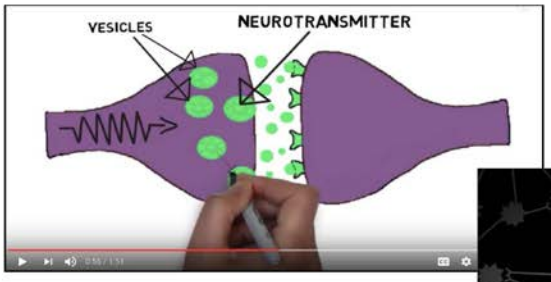


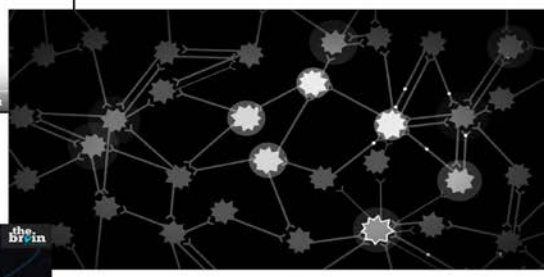
THE NEURON

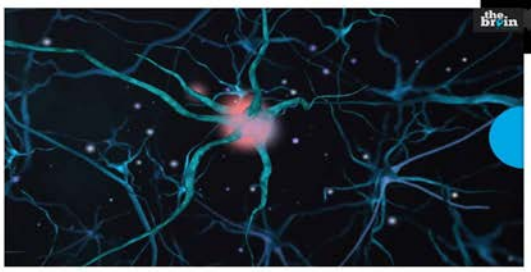


Using the video about the parts of the neuron, students will make a model neuron out of object - ideally candy. We should take photos of the models before eating them.

HOW A NEURON WORKS

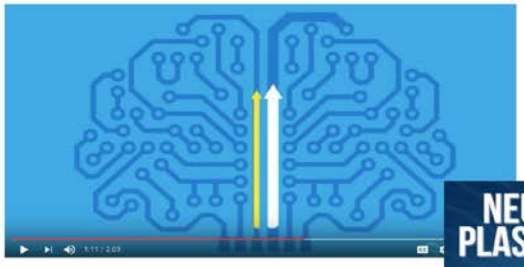






Checking for Understanding:
Although neurons don't touch each other, how do messages get from one neuron to the next?

NEUROPLASTICITY



Checking for Understanding:
If you were to explain neuroplasticity to a friend, what would you say?

HOW DOES OUR BRAIN GROW?

From Exceptional Children: An Introduction to Special Education (6th ed.) (pp. 156-159) by William L. Heward (2000). Upper Saddle River, NJ: Merrill/Prentice Hall.

Skeels and Dye Study (1966) - Small Groups

Making Mistakes Makes Your Brain Grow

Checking for Understanding: In a well-thought out paragraph, explain how we know that people can actually get smarter using at least three pieces of evidence from our unit so far.

WHAT HAVE WE LEARNED SO FAR?

Kahoot!

WHAT IS GROWTH MINDSET?

OR

Activity?

- **Checking for Understanding**: List three characteristics of a person with growth mindset and three characteristics of a person with a fixed mindset
- Have a list of "real life" scenarios and students identify how a person with a growth mindset would approach the situation and how a person with a fixed mindset would approach the situation
- Break the students up into small groups. Give each group a scenario to act out in which one character has a growth mindset and one has a fixed mindset.
- Create posters comparing the two mindset to hang around the school and in classrooms.

HOW IS GROWTH MINDSET CONNECTED TO PBL?

Brainstorm in Small Groups:
How might having a growth mindset or learning about growth mindset help students in a proficiency-based system (our system where you have to work until you show proficiency in a competency)? Try to be specific as possible.

PERSEVERANCE

Checking for Understanding: What are your experiences with perseverance? Answer the following two questions: 1. Describe something that you have spent a lot of time working to get better at or working to complete? 2. What is something that you have always wanted to learn how to do?

Project

Choose something that you have always wanted to learn how to do, that is long-term, and can be practiced in school.

Appendix E: Parent Consent Form

September 5, 2018

Dear Parent/Guardian,

As a part of my graduate work at the University of South Carolina, I will be conducting a study in my advisory classroom that is focused on the impact of a particular curriculum on student learning. Although there are absolutely no risks to the students who participate in this study, the results of the study could contribute to the database of educational knowledge that currently exists and improve instruction moving forward.

As part of this study, the students will take a preliminary survey focused on their learning mindsets. You may view the survey in advance if you would prefer. The results of the survey will be confidential. The students will then participate in a specific learning activity that will take place over a 3-4 week period. The learning activity has a strong educational foundation and all students will be complete the activity as part of the regular advisory curriculum. At the conclusion of the activity, the students will take another survey that is similar to the first the measure any changes in their learning mindsets. Additionally, the students will be interviewed regarding their opinions of the new curriculum. These responses will also be kept confidential.

The ethical nature of the study has been approved by the university, and the information about each student will be kept confidential. I will be the only individual to see both the results of the student surveys. All notes and surveys will be destroyed upon completion of the dissertation. The dissertation that results from this research may be published but it is important to know, however, that neither your name or your student's name, or even the name of the school for that matter, will ever be referenced; even the school district

has been assigned an alias. Results will be reported out in a qualitative manner that keeps all students anonymous.

I would sincerely appreciate it if you would allow your student to participate in this important study, and I would also be appreciative if you would complete the parent survey. Please know that if you choose not to have your child participate, there will be no penalty. The student's grade and treatment will not be affected. Participation is voluntary and the student can be removed from the study at any point.

All students will have the benefit of participating in the curriculum but if you would rather that your student's information not be gathered, please submit your wishes in writing. You may also remove your child from the study at any point by submitting the withdrawal in writing.

Please do not hesitate to contact me with any questions at 207-439-1121 x151 or jdufort@kitteryschools.com. Upon request, I would be happy to provide you with the contact information for my dissertation chairperson as well.

Thank you,

Jennifer Jo L. Dufort Humanities
Department R.W. Traip Academy